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ABSTRACT

The major goal of the Comprehensive Instructional Management System for mathematics is to provide the classroom teacher in New York City with a well-structured, objective-based curriculum. This second part of the manual for Level 4 includes modules for 14 topics: (1) numbers and numeration; (2) addition of whole numbers; (3) subtraction of whole numbers; (4) multiplication of whole numbers; (5) division of whole numbers; (6) fractions; (7) decimals; (8) integers; (9) geometry; (10) measurement; (11) algebraic concepts; (12) graphs, probability and statistics; (13) problem solving; and (14) review. The recommended instructional sequence is listed, followed by the content listed by topic. Reinforcement of previously learned skills is incorporated. Each objective is considered, with vocabulary, activities for getting started, and teaching strategies to use. The pupil's worksheets are interspersed. Resource materials, symbols, and equipment lists are included. (MNS)

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# CIMS

# COMPREHENSIVE INSTRUCTIONAL MANAGEMENT SYSTEM

# A Cyclical Mathematics Curriculum

## PART 2 — TEACHER

SE 047 760

NEW YORK CITY BOARD OF EDUCATION
OFFICE OF CURRICULUM DEVELOPMENT AND SUPPORT
DIVISION OF CURRICULUM & INSTRUCTION

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131 Livingston Street, Brooklyn, N.Y. 11201. Checks should be made payable to
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See catalogue for price.

# FOREWORD

The Comprehensive Instructional Management System (CIMS) is a unified mathematics curriculum for grades K-7. The curriculum is cyclical in design, and reflects the most recent New York City and New York State guidelines.

Utilizing the experience of our system's teachers, we have developed a teacher-designed curriculum that includes a rich selection of classroom-tested successful mathematics activities. The major goal of the CIMS mathematics project is to provide the classroom teacher with a well-structured, objective-based curriculum. All objectives are supported by a variety of strategies. Student mastery of these objectives is readily diagnosed through the system's testing component.

The curriculum format is structured to allow the teacher to determine the ability level of the students in the topic under study, and to permit the students to move forward at their individual rates. Each module of instruction provides the teacher with a set of related performance objectives. These objectives are supported by activities which probe and develop the students' readiness to undertake new skills and concepts. Further reinforcement is given to mastery of the objectives through accompanying student workbooks.

It is hoped that this curriculum will not only assist teachers in developing vital mathematics instruction, but will serve to expand and enrich students' mathematics skills.

Charlotte Frank

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# INTRODUCTION

The Comprehensive Instructional Management System (CIMS) is a teacher-designed educational delivery system composed of a curriculum, a testing component and a computer managed reporting system.

Designed to support mathematics instruction in the classroom, CIMS provides a comprehensive cyclical mathematics curriculum for grades K through 7. Each manual describes the curriculum for a single level or grade. Teacher curriculum developers from elementary, intermediate and senior high schools utilized the most current New York City and New York State guidelines in formulating the curriculum's modules and sequence.

## Curriculum Topics

The CIMS mathematics curriculum has been organized into the following 14 topics:

.01 Numbers and Numeration
.02 Addition of Whole Numbers
.03 Subtraction of Whole Numbers
.04 Multiplication of Whole Numbers
.05 Division of Whole numbers
.06 Fractions
.07 Decimals
.08 Integers
.09 Geometry
.10 Measurement
.11 Algebraic Concepts
.12 Graphs, Probability, Statistics
.13 Problem Solving
.14 Review

## Modules of Instruction

The CIMS curriculum is organized into modules or groupings of similar skills or understandings. Each module has a suggested period of duration for student mastery, a listing of new skills to be mastered by the student in the form of performance objectives, a section devoted to vocabulary, terms and symbols, getting started activities which serve as prerequisite skills in preparation for undertaking new objectives, strategies for teaching the new skills and student activities for providing reinforcement for the newly learned objective. Note that the lesson duration is included only as a guideline to the teacher for planning purposes. The actual time required for each module will vary from class to class and from child to child depending on the needs of the students and the teacher's judgment.

## Priorities of Performance Objectives

There is an order of priority to be recognized in teaching the content presented in the CIMS NEW YORK CITY MATHEMATICS CURRICULUM. Performance objectives with the greatest priority are so basic that unless the student acquires a satisfactory degree of competency in them, the student cannot progress. Such topics are marked A and mastery by all pupils is essential.

Performance objectives marked B are required to be presented to all students. Mastery is not expected at this time. These objectives will be developed further and reinforced later.

Performance objectives marked C are of special interest. These should be taught to increase positive attitudes towards mathematics.

Summary: A - Mastery of this objective is essential for progress. Opportunities for reinforcement should be provided throughout the school year.

B - These objectives are to be taught to all pupils. Mastery is not essential at this time because the topics will be further developed and reinforced.

C - Objectives of special interest.

## Topic Tab Key

01. Numbers and Numeration

02. Addition of Whole Numbers

03. Subtraction of Whole Numbers

04. Multiplication of Whole Numbers

05. Division of Whole Numbers

06. Fractions

07. Decimals

08. Integers

09. Geometry

10. Measurement

11. Algebraic Concepts

12. Graphs, Probability, Statistics

13. Problem Solving

14. Review

## Module Coding Key

**4.06.03.03A**

**Grade level**
(Grade 4)

**Topic number**
(.06 Fractions)

**Module ranking within topic and level**
(Equivalent Fractions)

**Performance objective within this module**
(The student will be able to
recognize equivalent fractions.)

**Priority**
(See page xvi)

# INSTRUCTIONAL SEQUENCE DESCRIPTION

An instructional sequence is given in list form on the following pages for this level. The sequence has been arranged to reflect what is considered the most effective presentation of the mathematics curriculum. Each module in the list is described by its unit number, module number, title, and page location.

The CIMS tests are integrated within the manual sequence. The test number is located in the first column. Each test is designed to assess priority objectives from the preceding modules. The tests are used to determine student mastery of specific performance objectives within these modules and appear in a multiple choice format. Each performance objective code number preceded by an * indicates that the performance objective is not tested on a CIMS cumulative test.

## INSTRUCTIONAL SEQUENCE - LEVEL 4

| TEST NUMBER | UNIT NUMBER | MODULE NUMBER | TITLE | PAGE NUMBER |
|---|---|---|---|---|
| | 1 | 4.14.01 | Review basic addition and subtraction facts | 1 |
| | 2 | 4.09.01 | Solid geometric figures (space figures) and their properties | 2 |
| | 3 | 4.14.02 | Place value | 3 |
| | 4 | 4.01.01 | Place value through thousands | 4 |
| | 5 | 4.12.01 | Graphs | 5 |
| | 6 | 4.13.01 | Problem solving: use tables and graphs to locate information | 7 |
| | 7 | 4.01.02 | Place value of 5- and 6-digit numbers | 8 |
| 4.01 | 8 | 4.01.03 | Round 4- and 5-digit numbers | 9 |
| | 9 | 4.10.01 | Money to fifty dollar bill | 10 |
| | 10 | 4.14.03 | Review - addition | 11 |
| | 11 | 4.02.01 | Addition of numbers through 4-digits | 12 |
| | 12 | 4.14.04 | Review - subtraction | 14 |
| | 13 | 4.03.01 | Subtraction of 4-digit numbers | 15 |
| | 14 | 4.06.01 | Addition and subtraction of fractions with common denominators | 17 |
| 4.02 | 15 | 4.11.01 | Open sentences | 18 |
| | 16 | 4.13.02 | Problem solving - use number sentences to solve problems | 19 |
| | 17 | 4.14.05 | Review - multiplication and division facts | 20 |
| | 18 | 4.04.01 | Basic multiplication facts for 11 and 12 through 144 | 21 |
| | 19 | 4.13.03 | Problem solving - guess and check | 22 |
| 4.03 | 20 | 4.04.02 | Multiplication of 2- and 3-digit numbers by a 1-digit number | 24 |
| **QUARTERLY TEST #1** | | | | |
| | 21 | 4.05.01 | Properties of division | 26 |
| | 22 | 4.05.02 | Division of a 2- and 3-digit dividend by a 1-digit divisor without regrouping | 27 |

## INSTRUCTIONAL SEQUENCE - LEVEL 4

| TEST NUMBER | UNIT NUMBER | MODULE NUMBER | TITLE | PA[illegible] NUMBER |
|---|---|---|---|---|
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## 4.02.02 ADDITION OF 5-DIGIT NUMBERS WITH OR WITHOUT REGROUPING (EXCHANGE) IN ONE OR MORE PLACES

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.02.02.01B add two or more 5-digit numbers and check; e.g,

$$\begin{array}{r} \prime\ \ \prime\ \ \ \ \\ 36{,}742 \\ +41{,}365 \\ \hline 78{,}107 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ \prime\ \ \prime\ \ \ \ \\ 41{,}365 \\ +36{,}742 \\ \hline 78{,}107 \end{array} \qquad \begin{array}{r} \prime\,\prime\ \ \prime\ \ \ \ \\ \$345.18 \\ 164.12 \\ +236.41 \\ \hline \$745.71 \end{array} \quad \uparrow \begin{array}{c} \underline{\text{check}} \\ \text{add} \\ \text{up} \end{array}$$

4.02.02.02B solve word problems related to skills learned in this module.
e.g.,

The population of Middletown is 23,648. Greenville has a population of 29,476. Pine City has a population of 38,460. What is the total population of the three cities?

4.02.02

## VOCABULARY

### TERMS

addends
ten thousands
hundred thousands

---

### GETTING STARTED 1:

Prepare and display two sets of numeral cards for the digits 0 through 9. On the chalkboard draw a place value chart through ten thousands. e.g.,

| ten thousands | thousands | hundreds | tens | ones |
|---|---|---|---|---|
| | | | | |

Shuffle the numeral cards and place them face down on a desk. Say, "We will use these numeral cards to build a 5-digit number." Ask a student to select a card, write that numeral in the column of his/her choice, and state the value of that digit.
e.g.,

7

| ten thousands | thousands | hundreds | tens | ones |
|---|---|---|---|---|
| 7 | | | | |

"7 in the ten thousands place means 70 thousand."

Continue this procedure until each place has a digit in it. Then ask a student to read the 5-digit number aloud and write it in standard form on the chalkboard. Ask another student to write the 5-digit number in expanded form.

Repeat this procedure of building other 5-digit numbers to reinforce place value concepts.

4.02.02

## GETTING STARTED 2:

Prepare a double set of numeral cards for the numerals 0 through 9. Draw eight boxes in two rows of four on the chalkboard and ask the students to do the same in their notebooks.

e.g.,

$$\begin{array}{r} \square\;\square\;\square\;\square \\ +\;\square\;\square\;\square\;\square \\ \hline \end{array}$$

Display the numeral cards. Say, "Each card has a numeral from 0 through 9 on it. You will try to place these numbers in the boxes so you will have the largest possible sum." Shuffle the cards and place them face down in a pile. Ask a student to select a card and say the numeral aloud. Ask the students to write that digit in one of the eight boxes in their notebooks. Repeat this procedure until all eight boxes are filled. Say, "You have made two 4-digit numerals. Now, find their sum." When each student has recorded the sum for his/her example, ask a student to read his/her addends and the sum aloud. Say, "Does anyone have a greater sum?" When the greatest sum has been named, that student may write and solve his/her example, using the boxes on the chalkboard.

Repeat this procedure with other numbers. The game may also be played with students trying to find smallest sums.

**4.02.02**

**4.02.02.01** **add two or more 5-digit numbers and check**

**STRATEGY 1:** Prepare and display a place value chart through the ten thousands place and ask the students to do the same in their notebooks.
e.g.,

| ten thousands | thousands | hundreds | tens | ones |
|---|---|---|---|---|

On the chalkboard write: $\begin{array}{r}38{,}427\\ \underline{+27{,}616}\end{array}$. Ask a student to write the example in the place value chart on the chalkboard as the other students write it in the place value chart in their notebooks. Say, "Before we add, we will estimate the sum. How shall we do that?" (We can round each addend to the nearest ten thousand and add the rounded numbers.) Ask a student to round each addend and write the rounded numbers on the chalkboard and find the estimated sum.
e.g.,

38,472 rounds to 40,000
+27,616 rounds to 30,000
70,000 is the estimated sum

Say, "Now we will add the original numbers to find the actual sum. In which column shall we begin adding? (We shall begin adding in the ones column.) How much are 7 ones plus 6 ones? (7 ones plus 6 ones equals 13 ones.) What must we do when we have 10 or more ones? (We must exchange 10 ones for 1 ten.) What will we write as the sum in the ones column? (We will write a 3 as the sum in the ones column.) What will we do with the 1 ten from the 13?" (We will show that we exchanged 10 ones for 1 ten by placing a 1 at the top of the tens column. This represents 1 ten. Then we will add it along with the other tens.) Continue this procedure as the digits in each column are added. Say, "What is the sum? (The sum is 66,043.) How do you know the sum is reasonable? (The sum is close to our estimate so it is reasonable.) We must still check the actual sum. How can we check

**STRATEGY 1:** cont'd

our sum?" (We can add up.) Ask the students to check their work. Repeat this procedure with other 5-digit addends. Eventually, the students should solve the examples without using the place value chart. The need for the correct alignment of the digits should be stressed.

**STRATEGY 2:**

Prepare a set of numeral cards as in Getting Started 2. Draw two rows of 5 boxes each on the chalkboard and ask the students to do the same in their notebooks.

e.g.,

□□□□□<br>
+□□□□□

Say, "We have played this game using two 4-digit numbers. Now we will use the cards to add 5-digit numbers to see who can make the greatest sum. What place value is represented by the boxes in the column farthest to the right? (This is the ones column.) What place value is to the left of the ones column? ... tens columns? ... hundreds column? ... thousands column? (To the left of the ones column is the tens column, ... hundreds column, ... thousands column, ... ten thousands column.) Is ten thousand greater than or less than one thousand? (Ten thousand is greater than one thousand.) How many times greater is it? (Ten thousand is ten times greater than one thousand.) As we move left on the place value chart, each place is ten times greater than the place before."

Ask several students to select the numeral cards, one at a time, as the other students record each digit in one of the boxes in their notebooks. When each of the ten boxes has a digit, ask the students to find the sum. Ask a student to read aloud his/her addends and the sum. Say, "Who has a greater sum?" Ask the student with the greatest sum to show his/her example on the chalkboard. Say, "What did you do whenever you had 10 or more in any one column? (I regrouped for 1 more in the next higher

**STRATEGY 2: cont'd** column). Are you sure your answer is correct? How can we check?" (We can add up.) Ask another student to come to the chalkboard to check. Say, "When we are looking for the greatest sum, where do we find the digits with the greatest value?" (We find the digits with the greatest value in the column farthest to the left, in this case, the ten thousands column.) If the example yields a 6-digit sum, say, "How many digits are in the sum? (There are six digits in the sum.) What is the place value of the sixth digit to the left in the sum?" The place value of that digit is hundred thousands.)

Repeat this procedure by shuffling the cards and asking other students to select the cards for a new game. As a variation, the students may try to create 5-digit numbers that will yield the least sum. The students may also expand the game to include 3 or more addends. To assist students in developing a successful strategy for building numbers that will yield the greatest sum or the least sum, say, "To get the greatest sum, how should you arrange the digits in the addends? (We should put the greater digits in the higher place value positions.) To get the least sum, how should you arrange the digits in the addends?" (We should put the lesser digits in the higher place value positions.)

**4.02.02.02** **solve word problems related to skills learned in this module**

**STRATEGY 1:** Write a word problem on the chalkboard.

e.g.,

> During the first week of July, there were 23,182 visitors to the Statue of Liberty. During the second week there were 38,468 visitors, 29,598 visitors during the third week, and 12,005 visitors during the fourth week. How many people visited the Statue of Liberty during July?

**STRATEGY 1:** cont'd

Ask a student to read the problem aloud. Say, "How can we solve this problem? (We can add the number of people who came each week.) Why will you add? (When we want to know the total we add.) What is a good estimate of the answer? (A good estimate would be 100,000 visitors.) How did you find the estimate?" (We rounded each addend to the nearest ten thousand and added the rounded numbers.)

Ask a student to solve the problem at the chalkboard as the other students solve it in their notebooks. Say, "What did you do whenever you had a sum of 10 or more in any column? (When we had a sum of 10 or more in any column, we regrouped the 10 as 1 more in the next higher place value.) What is the sum? (The sum is 103,253.) How can we check to see if the sum is correct?" (We can add up.) Ask the students to check their work. Say, "What is the answer to the problem?" (103,253 people visited the Statue of Liberty in July.)

Repeat this procedure with other word problems. e.g.,

- 28,317 people visited the World Trade Center in July. In August, there were 35,295 visitors. How many people visited the World Trade Center in all during July and August?

- The beach at Coney Island attracts many swimmers. On Memorial Day weekend, 45,280 people were there. On Labor Day weekend, there were 36,975 people. Find the total number of people on the beach for the two weekends.

P.O. 4.02.02.01

**NAME:** ______________________ **CLASS:** ________ **DATE:** ________

Add and check. Find each answer in the code boxes and write the code letter above the example letter at the bottom of the page to solve the riddle.

# If 10 dragons are a clan and 20 dragons are a herd, what are 30 and 40?

Code

| 76,921 | 94,406 | 35,813 | 127,703 | $889.21 | $780.22 |
|---|---|---|---|---|---|
| E | N | S | T | V | Y |

① 
$$\begin{array}{r} 12,345 \\ +\ 23,468 \\ \hline \end{array}$$

② 
$$\begin{array}{r} 60,132 \\ +\ 16,789 \\ \hline \end{array}$$

③ 
$$\begin{array}{r} \$333.98 \\ +\ 555.23 \\ \hline \end{array}$$

④ 
$$\begin{array}{r} 28,450 \\ +\ 48,471 \\ \hline \end{array}$$

⑤ 
$$\begin{array}{r} 35,425 \\ 46,619 \\ +\ 12,362 \\ \hline \end{array}$$

⑥ 
$$\begin{array}{r} 73,628 \\ +\ 54,075 \\ \hline \end{array}$$

⑦ 
$$\begin{array}{r} \$428.56 \\ 246.98 \\ 104.68 \\ \hline \end{array}$$

___ ___ ___ ___ ___ ___ ___

① ② ③ ④ ⑤ ⑥ ⑦

P.O. 4.02.02.02

NAME:______________________________ CLASS:__________ DATE:________

Solve each problem and check.

| | | |
|---|---|---|
| 1. Our school district had three deliveries of pencils last year. 15,238 pencils were delivered in January, 22,465 in May and 18,562 in September. How many pencils were delivered last year?<br>__________pencils | **solve** | **check** |
| 2. Mr. and Mrs. Smith bought new furniture for their apartment. They bought a bookcase for $117.50, a dining table for $385.50, and a couch for $399.99. How much did they spend in all?<br>__________ | **solve** | **check** |
| 3. There were 11,281 spectators at the baseball game on Friday, 16,060 spectators on Saturday, and 10,420 spectators on Sunday. How many spectators were there during the 3 days?<br>__________spectators | **solve** | **check** |
| 4. On one day 42,516 people visited Disney World in Orlando, Florida. On another day, 39,246 people visited Disney World. How many people visited during the 2 days?<br>__________people | **solve** | **check** |

## Do you remember?

Max placed 3 red blocks, 4 blue blocks, and 1 green block in a bag. If he picks a block out of the bag without looking, what is the probability that he will pick a red block?
The probablity of picking a red block is ______________.

Unit 38

## 4.03.02 SUBTRACTION OF 5-DIGIT NUMBERS WITH OR WITHOUT REGROUPING (EXCHANGE) IN ONE OR MORE PLACES

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.03.02.01B subtract a 2-, 3-, 4- and 5-digit number from a 5-digit number and check;
e.g.,

$$\begin{array}{r} \overset{5}{\cancel{6}}\overset{16}{\cancel{6}},\overset{8}{\cancel{9}}\overset{14}{\cancel{4}}2 \\ -49,852 \\ \hline 17,090 \end{array} \qquad \begin{array}{r} \text{check} \\ \overset{1}{1}7,\overset{1}{0}90 \\ +49,852 \\ \hline 66,942 \end{array} \qquad \begin{array}{r} \$\overset{1}{\cancel{2}}\overset{13}{\cancel{3}}6.\overset{8}{\cancel{9}}\overset{11}{\cancel{1}} \\ -\ \ 41.69 \\ \hline \$195.22 \end{array} \qquad \begin{array}{r} \text{check} \\ \$\overset{1}{1}95.\overset{1}{2}2 \\ +\ \ 41.69 \\ \hline \$236.91 \end{array}$$

4.03.02.02B subtract a 2-, 3-, 4- and 5-digit number from 10,000 and multiples of 10,000 and check;
e.g.,

$$\begin{array}{r} \overset{0}{\cancel{1}}\overset{\overset{9}{\cancel{10}}}{\cancel{0}},\overset{\overset{9}{\cancel{10}}}{\cancel{0}}\overset{\overset{9}{\cancel{10}}}{\cancel{0}}\overset{10}{\cancel{0}} \\ -\ 3,674 \\ \hline 6,326 \end{array} \qquad \begin{array}{r} \text{check} \\ \overset{1}{6},\overset{1}{3}\overset{1}{2}6 \\ +3,674 \\ \hline 10,000 \end{array} \qquad \begin{array}{r} \$\overset{0}{\cancel{1}}\overset{\overset{9}{\cancel{10}}}{\cancel{0}}\overset{\overset{9}{\cancel{10}}}{\cancel{0}}.\overset{\overset{9}{\cancel{10}}}{\cancel{0}}\overset{10}{\cancel{0}} \\ -\ \ 29.65 \\ \hline \$70.35 \end{array} \qquad \begin{array}{r} \text{check} \\ \$\overset{1}{7}\overset{1}{0}.\overset{1}{3}5 \\ +\ 29.65 \\ \hline \$100.00 \end{array}$$

4.03.02.03B solve word problems related to skills learned in this module.
e.g.,

> There were 43,317 people at the concert during the first week and 24,273 people during the second week. How many more people attended the concert during the first week than the second week?

## 4.03.02

## VOCABULARY

## TERMS

---

## GETTING STARTED 1:

Prepare several open addition sentences.

e.g.,

$$326 + \square = 1{,}018$$
$$\square + 274 = 821$$

Display the first open sentence and say, "What is missing in this addition sentence? (An addend is missing.) How can we find a missing addend? (We can subtract the known addend from the sum.) Before we subtract, let's estimate. How can we do that?" (We can round each number to the nearest hundred and subtract the rounded numbers.) Ask a student to show the estimate on the chalkboard.

e.g., Estimate

1,000 - 300 = 700

Say, "Now that we know about how much is missing, let's find the exact answer." Ask a student to write the appropriate example next to the estimate on the chalkboard and solve it as the other students solve it in their notebooks.

e.g., Estimate

1,000 - 300 = 700

$$\begin{array}{r} \overset{0}{\cancel{1}},\overset{\overset{9}{\cancel{10}}}{\cancel{0}}\overset{11}{\cancel{1}}8 \\ -\quad 326 \\ \hline 692 \end{array}$$

Say, "Why did we regroup? (We regrouped because there were not enough tens.) Why did we regroup one thousand for ten hundreds? (We regrouped 1 thousand for 10 hundreds because we did not have 1 hundred to regroup for 10 tens.) What is the difference? (The difference is 492.) How do you know the answer is reasonable? (The answer is close to our estimate. Therefore, it is reasonable.) How can we be sure that our answer is correct?" (We can write this number in the box in the addition sentence, add it to 526, and see if the sum is 1,018.) Ask the students to check their work.

Repeat this procedure with other open addition sentences.

## GETTING STARTED 2:

Prepare and display a word problem involving subtraction from a 4-digit minuend. Ask a student to read it aloud.

e.g.,

> Sally went into a clothing store and spent exactly $50.00. She bought a pair of pants and a beautiful green and pink cotton blouse. If the pants cost $26.95, how much did the blouse cost?

Say, "What are we asked to find? (We are asked to find the price of the blouse.) What do we already know? (We know that Sally spent a total of $50.00 and we know the pants cost $26.95.) How can we solve the problem? (We can subtract the price of the pants, $26.95, from $50.00.) Before we subtract, we will estimate to get an idea of about how much the blouse cost. How can we do that? (We can round $26.95 to the nearest ten dollars and subtract the amount from $50.00.) How much is $26.95 rounded to the nearest ten dollars? ($26.95 rounded to the nearest ten dollars is $30.00.) How much is 50 dollars minus 30 dollars?" (50 dollars minus 30 dollars is 20 dollars.) Write the following on the chalkboard:

$50.00 $50.00<br>
-26.95 rounds to 30.00<br>
$20.00 is the estimated difference

Say, "About how much did the blouse cost? (The blouse cost about $20.00.) Now that we know about how much the blouse cost, let's solve the problem." Ask the students to solve the problem in their notebooks as one student works at the chalkboard. Say, "What is the difference? (The difference is $23.05.) How do you know this is a reasonable answer? (The answer is close to our estimate.) How can we check the answer?" (We can add $23.05 and 26.95 to see if the sum is $50.00.) Ask the students to check their work. Say, "What is the answer to the problem?" (The blouse cost $23.05.)

Repeat this procedure with other problems involving 4-digit minuends.

**4.03.02**

**4.03.02.01** subtract a 2-, 3-, 4-, or 5-digit number from a 5-digit number and check

**STRATEGY 1:** Adapt Strategy 2, P.O. 4.14.04.02 (p.14S.5) for use with 5-digit numbers.

**STRATEGY 2:** Prepare a group of addition examples, each with a missing addend. These examples will incorporate subtraction from a 5-digit number while reinforcing a method for finding a missing addend. Write one example on the chalkboard.

e.g.,

$$\begin{array}{r} 10{,}967 \\ +\boxed{\phantom{00000}} \\ \hline 11{,}696 \end{array}$$

Say, "What is missing in this example? (An addend is missing.) How can we find a missing addend? (We can subtract the addend we know from the sum to find the missing addend.) How can we determine about how much is missing? (We can estimate by rounding the sum and the addend to the nearest thousand and subtracting.) What is 11,696 rounded to the nearest thousand? (11,696 rounded to the nearest thousand is 12,000.) What is 10,967 rounded to the nearest thousand? (10,967 rounded to the nearest thousand is 11,000.) How much is 12,000 minus 11,000? (12,000 minus 11,000 equals 1,000.) What is our estimate of the missing addend?" (Our estimate is 1,000.) Write the following on the chalkboard:

 11,696 rounds to 12,000
-10,967 rounds to 11,000
 1,000 is the estimated difference.

Ask the students to write this in their notebooks.

Say, "Now we will find the actual difference." Point to the actual example and say, "Why can't we subtract in the ones column? (We cannot subtract in the ones column because 7 is greater than 6.) What can we do so we will be able to subtract? (We can exchange 1 ten for 10

**STRATEGY 2:** cont'd

ones.) How many tens will we have now in the minuend? (We will have 8 tens in the minuend.) How many ones will we have now in the minuend?" (We will have 16 ones in the minuend.) Ask a student to show the exchange at the chalkboard as the other students do the same in their notebooks. Repeat this procedure to complete the example. Say, "What is the difference? (The difference is 729.) How do you know 729 is a reasonable answer? (729 is close to our estimate of 1,000. Therefore, it is a reasonable answer.) How can we check our answer to be sure it is the correct missing addend? (We can check by writing 729 as the missing addend, and adding to see if the sum is 11,696.) How is this the same as checking a subtraction example?" (It is the same because we are adding the difference to the subtrahend to see if the sum equals the minuend.) Ask the students to check their work. Say, "How did we find the missing addend?" (We subtracted the other addend from the sum. The difference was the missing addend.)

Repeat this procedure with other examples.

**4.03.02.02** **subtract a 2-, 3-, 4-, and 5-digit number from 10,000 and multiples of 10,000 and check**

**STRATEGY 1:** Adapt Strategy 2, P.O. 4.03.01.04 (p.16S.7) for use with minuends of 10,000 and multiples of 10,000.

**STRATEGY 2:** Adapt Strategy 2, P.O. 4.03.02.01 (p.50S.1) for use with examples such as:

$$\begin{array}{r} 4{,}687 \\ +\boxed{\phantom{0000}} \\ \hline 30{,}000 \end{array} \qquad \begin{array}{r} \boxed{\phantom{00000}} \\ +23{,}278 \\ \hline 50{,}000 \end{array}$$

**4.03.02.03** **solve word problems related to skills learned in this module**

**STRATEGY 1:** Prepare a set of word problems. Display a problem on the chalkboard and ask a student to read it aloud.

**STRATEGY 1:** e.g.,
cont'd

> Ms. Brant went shopping at the supermarket. She left home with $100.00 She returned with a lot of groceries and $12.74 change. How much did Ms. Brant spend at the supermarket?

Say, "What do we have to find? (We have to find how much Ms. Brant spent at the supermarket.) What information does the problem give us? (We know how much money she started with and how much she had when she finished.) How can we find the answer to the problem?" (We can subtract her change, $12.74, from the amount with which she started, $100.00.) Ask a student to write the appropriate subtraction example on the chalkboard. e.g.,

$$\begin{array}{r} \$100.00 \\ \underline{-\ \ 12.74} \end{array}$$

Say, "First we will estimate to find out about how much she spent. How can we do this? (We can round the numbers to the nearest ten dollars and subtract.) 100 dollars is already rounded to the nearest ten dollars. What is $12.74 rounded to the nearest ten dollars? ($12.74 rounded to the nearest ten dollars is 10 dollars.) How much is 100 dollars minus 10 dollars?" (100 dollars minus 10 dollars equals 90 dollars.) Write the following on the chalkboard:

$$\begin{array}{rlr} \$100.00 & & \$100.00 \\ \underline{-\ \ 12.74} & \text{rounds to} & \underline{10.00} \\ & & \$90.00 \text{ is the estimated difference} \end{array}$$

Ask a student to solve the example at the chalkboard as the other students solve it in their notebooks.
Say, "What is the difference? (The difference is $87.26) How can we check our subtraction?" (We can add the difference to the subtrahend to see if they equal the minuend.) Ask the students to check their work. Say, "What is the answer to the problem?" (Ms. Brant spent $87.26 at the grocery store.)
Repeat this procedure with other word problems.

4.03.02.01 & .03

**NAME:** ______________________ **CLASS:** ________ **DATE:** ________

Solve and check.

| | |
|---|---|
| ① **check**<br>$\overset{6}{\cancel{7}}\overset{13}{\cancel{3}}$,109<br>-56,107<br>17,002 | ② **check**<br>94,949<br>-12,843 |
| ③ **check**<br>47,796<br>-28,615 | ④ **check**<br>89,242<br>-68,100 |
| ⑤ **check**<br>94,949<br>- 5,843 | ⑥ **check**<br>78,343<br>-69,211 |
| ⑦ **check**<br>82,727<br>-14,555 | ⑧ **check**<br>77,284<br>- 148 |
| ⑨ **check**<br>98,343<br>- 74,211 | ⑩ **check**<br>79,353<br>- 58,211 |

⑪ After the Girl Scout cookie sale, Troop 207 had \$532.90 and Troop 142 had \$629.45. How much more money did Troop 142 have than Troop 207 after the cookie sale?

______________________________

P.O. 4.03.02.02-.03

NAME: ______________________ CLASS: ________ DATE: ________

Solve and check.

① **solve** **check**

80,000
- 1,383

② **solve** **check**

90,000
- 9,383

③ **solve** **check**

10,000
- 754

④ **solve** **check**

20,000
- 4,084

⑤ **solve** **check**

30,000
- 9,995

⑥ **solve** **check**

50,000
- 17,681

⑦ **solve** **check**

$400.00
- 36.88

⑧ **solve** **check**

$700.00
- 148.75

⑨ Ms. Dalton had $600.00 in the bank. She took $128.85 out of the bank to buy a new set of dishes. How much money does she have left in the bank?

____________________ left in the bank

P.O. 4.03.02.03

NAME:____________________ CLASS:________ DATE:_______

Solve each problem and check.

| | | |
|---|---|---|
| 1. A police force has 18,630 members. If 3,557 are women, how many members of the police force are men?<br>________________ members | solve | check |
| 2. The letter carriers in a local Post Office delivered 24,275 letters during the first week of November. During the second week, they delivered 20,684 letters. How many more letters did they deliver during the first week than the second week?<br>____________ letters | solve | check |
| 3. In 1984, there were 45,291 teachers in a large city. In 1985, that city had 51,384 teachers. How many more teachers were there in 1985 than in 1984?<br>________________ teachers | solve | check |
| 4. A fire department had 28,807 fire fighters. How many fire fighters will they have if that amount decreases by 1,489?<br>________________ fire fighters | solve | check |

## Do you remember?

Complete each pair of equivalent fractions.

$\frac{1}{5} = \frac{3}{\square}$ $\frac{1}{2} = \frac{\square}{8}$ $\frac{3}{4} = \frac{9}{\square}$

# SHARPENING YOUR SKILLS

**Units 37, 38**

**Name:** ____________________ **Class:** ____________ **Date:** ____________

1. What digit belongs in the box?

$$\begin{array}{r} 27{,}374 \\ +\;61{,}\boxed{\phantom{0}}78 \\ \hline 88{,}552 \end{array}$$

ⓐ 2
ⓑ 8
ⓒ 1
ⓓ Not Here

2.

$$\begin{array}{r} 87{,}324 \\ -56{,}832 \\ \hline \end{array}$$

ⓔ 144,156 ⓖ 30,492
ⓕ 31,523 ⓗ Not Here

3. Solve.

$$\begin{array}{r} 17{,}195 \\ +26{,}836 \\ \hline \end{array}$$

4. The Sports Arena holds 18,367 people. If the Sports Arena is filled on Saturday night and Sunday, what will the attendance be for the 2 days?

__________ people

5. Solve and check.

$$\begin{array}{r} 75{,}825 \\ -36{,}544 \\ \hline \end{array}$$

6.

$257.34 + $128.35 + $268.89 = ☐

ⓐ $653.58 ⓒ $654.48
ⓑ $654.58 ⓓ Not Here

7. 75,817 - 36,389 = ☐

ⓔ 39,428 ⓖ 112,206
ⓕ 39,488 ⓗ Not Here

8. The coat Mr. Carlton wanted to buy cost $129.00. The clerk told him the coat was on sale for $35.99 less than the original price. What was the reduced price of the coat?

The reduced price was ______.

## 4.06.05 IMPROPER FRACTIONS AND MIXED NUMBERS

(1-2 lessons)

## PERFORMANCE OBJECTIVES

The student will be able to...

4.06.05.01A identify and define improper fractions and mixed numbers;

e.g.,

| Improper fractions have a numerator that is greater than or equal to the denominator. | A mixed number is made up of a whole number and a fraction. |
|---|---|
| $\frac{5}{4}$ , $\frac{6}{6}$ | $1\frac{1}{2}$ , $2\frac{3}{5}$ |

4.06.05.02B change an improper fraction to a mixed number or a whole number;

e.g.,

$$\frac{5}{3} = 1\frac{2}{3}$$

$$\frac{4}{4} = 1$$

$$\frac{6}{3} = 2$$

4.06.05.03B change a mixed number or a whole number to an improper fraction.

e.g.,

$$1\frac{3}{4} = \frac{7}{4}$$

$$2 = \frac{4}{2}$$

## VOCABULARY

### TERMS

numerator
denominator
fraction
improper fraction
mixed number

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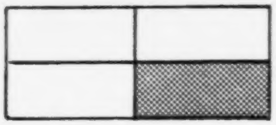
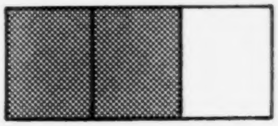
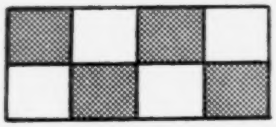
### GETTING STARTED 1:

Draw the following figures on the chalkboard.

1. 

2. 

3. 

Say, "Look at the first figure. How many equal parts are in this figure? (There are 4 equal parts.) How many parts are shaded? (One part is shaded.) How many parts are not shaded?" (3 parts are not shaded.)

Ask a student to write the fractions that represent the shaded and the unshaded parts of the first figure on the chalkboard, e.g., $\frac{1}{4}$ and $\frac{3}{4}$. Say, "What is the same about these two fractions? (They have the same denominator.) What is different about the fractions? (The numerators are different.) What does the denominator tell us? ... numerator tell us? (The denominator tells us the number of equal parts into which the whole is divided. The numerator tells us the number of parts we are talking about.) Which fraction is greater? ($\frac{3}{4}$ is greater than $\frac{1}{4}$.) How many fourths are needed to equal 1 whole?" (4 fourths equal 1 whole.) Repeat this procedure with the other figures.

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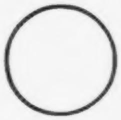
### GETTING STARTED 2:

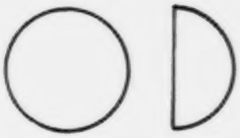
Prepare and display a demonstration set of fractional pieces (wholes, halves, thirds, sixths, and eighths). Display one whole on the chalkboard.

e.g.,



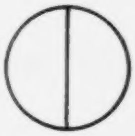
**GETTING STARTED:** (cont'd)

Display one half of this figure next to the whole.
e.g.,



Ask a student to write the fraction that one half represents on the chalkboard, e.g., $\frac{1}{2}$.

Say, "How many halves will equal the whole circle?" (Two halves will equal the whole.) Ask a student to demonstrate this by placing 2 halves on the whole circle.
e.g.,



Say, "We know that two halves equal one whole. How can we write two halves as a fraction?" (Two halves is written with a 2 as the numerator and a 2 as the denominator.) Ask a student to come to the chalkboard and write two halves as a fraction, e.g., $\frac{2}{2}$.

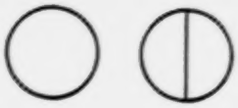
Repeat this procedure to demonstrate how many thirds, fourths, sixths, and eighths equal one whole.

**4.06.05**

**4.06.05.01** **identify and define improper fractions and mixed numbers**

**STRATEGY 1:** Prepare flannel-backed fractional parts and a flannel board. Display one whole on the flannel board. Say, "How many halves equal one whole?" (Two halves equal one whole.) Ask a student to use the fractional parts to demonstrate the equivalence of two halves and one whole.

e.g.,



On the chalkboard write: $\frac{2}{2}$ = 1 whole. Say, "How can we tell when a fraction equals one whole?" (A fraction equals one whole when the numerator is the same as the denominator.) Ask a student to remove one half from the flannel board. Say, "What is the value of the remaining fractional part? (The value of the remaining fractional part is one half.) How does one half compare to one whole? (One half is less than one whole.) How can we tell when a fraction will be less than one whole?" (A fraction is worth less than one whole when the numerator is less than the denominator.)

Ask a student to use 3 halves to make as many wholes as possible on the flannel board. Say, "How many halves did you use? (I used 3 halves.) How many wholes did you make?" (I made 1 whole and I had one half left over.) On the chalkboard write: $\frac{3}{2} = 1\frac{1}{2}$. Say, "Look at the fraction. How shall we read this fraction? (We shall read it as three halves.) What do you notice about the numerator and the denominator in the fraction $\frac{3}{2}$?" (The numerator is greater than the denominator.) Write on the chalkboard and say, "When the numerator and the denominator are equal, the fraction is equal to 1 whole. When the numerator is greater than the denominator, the fraction will be worth more than one whole. A fraction that is equal to or greater than one whole is called an improper fraction." Ask the students to write this definition in their notebooks.

**STRATEGY 1:**
cont'd

Below the fraction $\frac{3}{2}$ on the chalkboard, write: improper fraction.

Say, "Look at the flannel board. What is another name for three halves?" (Another name for three halves is one and one half.) Pointing to $1\frac{1}{2}$ on the chalkboard, say, "We read this number as one and one half. What is special about this number?" (It is made up of a whole number and a fraction.) Say and write on the chalkboard, "A number that is made up of a whole number and a fraction is called a mixed number." Ask the students to write this in their notebooks.

Write several fractions (both proper and improper), whole numbers, and mixed numbers on the chalkboard. e.g.,

$$\frac{1}{2} \quad \frac{4}{3} \quad \frac{6}{5} \quad 2\frac{1}{3} \quad 5 \quad 3\frac{1}{2} \quad 3\frac{1}{2} \quad 9 \quad \frac{3}{2} \quad \frac{5}{4} \quad 3\frac{1}{3} \quad 12$$

Ask a student to come to the chalkboard and circle all the improper fractions. Ask another student to circle all the mixed numbers. Ask all the students to read the circled numbers aloud.

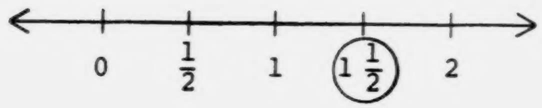
Repeat this procedure with other numbers. Say, "How can we identify an improper fraction? (An improper fraction has a numerator that is greater than or equal to the denominator.) How can we identify a mixed number?" (A mixed number is made up of a whole number and a fraction.)

**STRATEGY 2:**

Prepare and distribute fractional pieces (halves, fourths, thirds) to each student or group of students. Write the number $1\frac{1}{2}$ on the chalkboard. Say, "We read this number as one and one half. What do you notice about the number? (It is a whole number and a fraction.) Which is the whole number? (The whole number is 1.) Which is the fraction? (The fraction is $\frac{1}{2}$.) One and one half is greater than 1 and less than 2. It is between 1 and 2 on a number line." Demonstrate at the chalkboard.

**STRATEGY 2:** cont'd

e.g.,



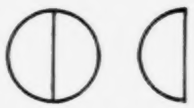
Write on the chalkboard and say, "A number that is made up of a whole number and a fraction is called a mixed number." Ask the students to write this in their notebooks. Write several mixed numbers on the chalkboard and ask the students to read them aloud.

e.g.,

$2\frac{1}{2}$, $1\frac{1}{3}$, $3\frac{3}{4}$, $4\frac{2}{3}$

Say, "Now use your halves to show one and one half." Ask a student to demonstrate at the chalkboard.

e.g.,



Say, "The number we have represented with our fractional pieces can be written as $1\frac{1}{2}$, a mixed number. We can also represent it as a fraction." Ask the students to count the number of halves needed to make one and one half. Say, "How many halves are there?" (There are 3 halves.) Write the fraction $\frac{3}{2}$ on the chalkboard and say, "What do you notice about the fraction $\frac{3}{2}$? (The numerator is larger than the denominator.) We can also use a fraction to name the number 1. If we talk about thirds, how many do we need to equal 1 whole?" $\frac{3}{3}$ equal 1 whole.) On the chalkboard write $\frac{3}{3} = 1$ whole. Say and write on the chalkboard, "A fraction whose numerator is greater than or equal to the denominator is called an improper fraction." Ask the students to write this definition in their notebooks. Write several improper fractions on the chalkboard and ask the students to read them aloud.

e.g.,

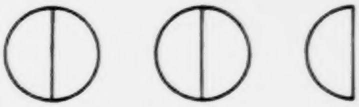
$\frac{4}{3}$, $\frac{5}{2}$, $\frac{7}{4}$, $\frac{5}{3}$, $\frac{6}{6}$

**4.06.05**

**4.06.05.02** **change an improper fraction to a mixed number or a whole number**

**STRATEGY 1:** Prepare and display a demonstration set of fractional pieces (halves, thirds, and fourths). On the chalkboard write: $\frac{5}{2}$. Ask a student to read the fraction aloud and say, "What kind of a fraction is $\frac{5}{2}$? ($\frac{5}{2}$ is an improper fraction.) Why is $\frac{5}{2}$ an improper fraction?" ($\frac{5}{2}$ is an improper fraction because the numerator is larger than the denominator.) Ask a student to come to the chalkboard and show $\frac{5}{2}$ with the fractional pieces, making as many wholes as possible.

e.g.,



Say, "We can also express $\frac{5}{2}$ as a mixed number. What is a mixed number? (A mixed number is made up of a whole number and a fraction.) How can we change $\frac{5}{2}$ to a mixed number? (We can count the number of wholes and then add the fraction that is left.) Let's look at the fractional pieces on the chalkboard. How many wholes are there?" (There are two wholes.) On the chalkboard, write the numeral 2. Say, "How many halves are left?" (One half is left.) Next to the numeral 2, write $\frac{1}{2}$. Say, "Five halves can be expressed as the mixed number $2\frac{1}{2}$." Repeat this procedure with $\frac{5}{4}$, $\frac{7}{4}$, $\frac{5}{3}$, $\frac{8}{3}$.

Say, "There is a faster way of changing an improper fraction to a mixed number." On the chalkboard write: $\frac{5}{2}$. Say, "What operation do we think of when we see the fraction $\frac{5}{2}$? (The fraction $\frac{5}{2}$ is also a division example.) We can divide 5 by 2. How much is 5 divided by 2? (5 divided by 2 equals 2 and there is a remainder of 1.) The 2 is written as the whole number and the remainder is written as a fraction with the divisor, 2, as the denominator." On the chalkboard write $\frac{5}{2} = 2\overline{)5} = 2\frac{1}{2}$. Write the following on the chalkboard:

**4.06.05**

**STRATEGY 1:** cont'd

**To Change an Improper Fraction to a Mixed Number**

1. Divide the numerator by the denominator.
   $\frac{5}{2} = 2\overline{)5} = 2\text{ R1}$
2. The quotient is written as a whole number and the remainder is written as a fraction, keeping the denominator of the original improper fraction. Therefore, $\frac{5}{2} = 2\frac{1}{2}$.

Say, "We can use these steps to change some improper fractions to whole numbers. However, if the improper fraction can be expressed as a whole number, there will be no remainder after we divide." On the chalkboard write: $\frac{6}{3}$. Say, "What is the first step in changing this improper fraction? (We should divide 6 by 3.) What is the result? (6 divided by 3 equals 2.) Is there a remainder? (No.) Therefore, $\frac{6}{3}$ can be expressed as the whole number, 2." Repeat this procedure to change other improper fractions to mixed numbers or whole numbers.

e.g.,

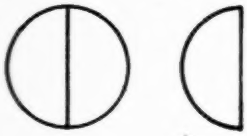
$\frac{4}{3} = 1\frac{1}{3}$ $\quad$ $\frac{6}{5} = 1\frac{1}{5}$ $\quad$ $\frac{8}{2} = 4$

$\frac{7}{3} = 2\frac{1}{3}$ $\quad$ $\frac{5}{4} = 1\frac{1}{4}$ $\quad$ $\frac{6}{6} = 1$

**4.06.05.03** **change a mixed or a whole number to an improper fraction**

**STRATEGY 1:** Prepare and display a demonstration set of fractional parts (halves, thirds, and fourths). Write the mixed number $1\frac{1}{2}$ on the chalkboard. Ask a student to read the number aloud and say, "What kind of a number is $1\frac{1}{2}$? (One and one half is a mixed number.) Why is $1\frac{1}{2}$ a mixed number?" (One and one half is a mixed number because it is made up of a whole number and a fraction.) Ask a student to come to the chalkboard and represent $1\frac{1}{2}$ with the fractional pieces using halves.

e.g.,



**STRATEGY 1:** cont'd

Say, $1\frac{1}{2}$ can also be expressed as an improper fraction. We can do that by telling how many halves are needed to equal $1\frac{1}{2}$. What is an improper fraction? (An improper fraction is a fraction whose numerator is greater than or equal to the the denominator.) How can we rename $1\frac{1}{2}$ as an improper fraction? (We can count the total number of halves and write that number as a fraction.) Let's look at the fractional pieces on the chalkboard. Into how many halves can the whole be divided? (It can be divided into 2 halves.) How many halves are there in all?" (There are 3 halves in all.) Ask a student to write $\frac{3}{2}$ on the chalkboard. Say, "There is a faster way of changing a mixed number to an improper fraction. The mixed number $1\frac{1}{2}$ can be changed to an improper fraction by multiplying the whole number, 1, by the denominator of the fraction. Then we add the numerator, 1, to that product. We keep the denominator that is in the mixed number." Demonstrate at the chalkboard.

e.g.,

**Changing a Mixed Number to an Improper Fraction**

$1\frac{1}{2}$

| | | |
|---|---|---|
| 1. | Multiply the denominator and the whole number. | 2 x 1 = 2 |
| 2. | Add the numerator to this product. The sum is the new numerator. | 2 + 1 = 3 |
| 3. | Use the denominator from the improper fraction. | $\frac{3}{2}$ |

Therefore, $1\frac{1}{2} = \frac{3}{2}$.

Ask the students to write these steps in their notebooks. Repeat the procedure by changing other mixed numbers to improper fractions.

Say, "We can change a whole number to an improper fraction. On the chalkboard write: $2 = \frac{\quad}{3}$. Say, "To change a whole number to an improper fraction we must

**STRATEGY 1:** cont'd

know the denominator of the new fraction. What will the denominator be?" (The denominator will be 3.) If we multiply the denominator times the whole number, we will get the numerator of the improper fraction."

e.g.,

$$2 = \frac{6}{3}$$

Say, "The whole number, 2, can be expressed as the improper fraction, $\frac{6}{3}$.

Repeat this procedure to change other whole numbers to improper fractons.

P.O. 4.06.05.01-.02

NAME: ______________________ CLASS: ________ DATE: ________

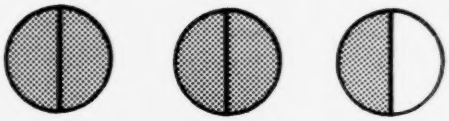
Follow the directions below.

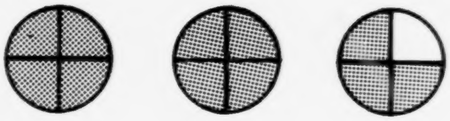
1. Place a ring around all the improper fractions.
Place a box around all the mixed numbers.

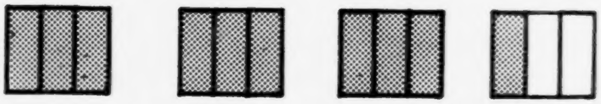
$\frac{8}{5}$ 3 $7\frac{1}{2}$ $\frac{4}{4}$ $\frac{9}{3}$ $6\frac{1}{2}$ 5

$\frac{4}{3}$ 2 $3\frac{1}{5}$ $\frac{7}{3}$ $\frac{9}{10}$ $5\frac{1}{3}$

2. Name each shaded amount as an improper fraction.

A.  = $\frac{5}{2}$

B.  = ________

C.  = ________

3. Rename each improper fraction as a mixed number.

A. $\frac{4}{3}$ = $1\frac{1}{3}$ D. $\frac{13}{6}$ = ________

B. $\frac{8}{5}$ = ________ E. $\frac{9}{4}$ = ________

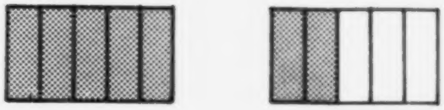
C. $\frac{11}{2}$ = ________ F. $\frac{7}{2}$ = ________

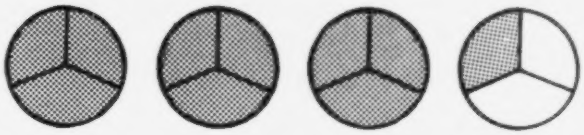
P.O. 4.06.05.03

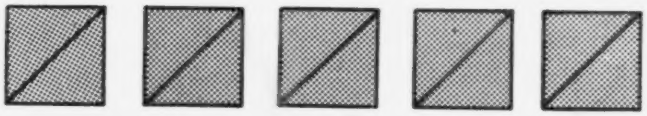
NAME: ______________________ CLASS: ________ DATE: ________

Follow the directions below.

1. Name each shaded amount as a mixed number or a whole number and as an improper fraction.

A.  = $1\frac{2}{5}$ or $\frac{7}{5}$

B.  = ______ or ______

C.  = ______ or ______

2. Rename each mixed number as an improper fraction.

A. $2\frac{1}{3} = \frac{7}{3}$

B. $4\frac{1}{2} =$ ________

C. $3\frac{1}{4} =$ ________

D. $6\frac{1}{3} =$ ________

E. $4\frac{1}{3} =$ ________

F. $1\frac{1}{10} =$ ________

G. $2\frac{3}{5} =$ ________

H. $5\frac{1}{4} =$ ________

Do you remember?

The Burger Barn sold 25 chocolate shakes on Monday, 33 chocolate shakes on Tuesday, and 38 chocolate shakes on Wednesday. Find the average number of chocolate shakes sold each day.

________ chocolate shakes

Solve

Unit 40

## 4.06.06 ADDITION AND SUBTRACTION OF MIXED NUMBERS WITH COMMON DENOMINATORS

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.06.06.01B add mixed numbers with common denominators; e.g.,

$$\begin{array}{rcl} 5\frac{1}{4} & = & 5 + \frac{1}{4} \\ +1\frac{1}{4} & = & 1 + \frac{1}{4} \\ \hline & & 6 + \frac{2}{4} = 6\frac{2}{4} \end{array}$$

4.06.06.02B subtract mixed numbers with common denominators; e.g.,

$$\begin{array}{rcl} 5\frac{3}{6} & = & 5 + \frac{3}{6} \\ -1\frac{2}{6} & = & 1 + \frac{2}{6} \\ \hline & & 4 + \frac{1}{6} = 4\frac{1}{6} \end{array}$$

4.06.06.03B solve word problems related to skills learned in this module. e.g.,

Jack ran $1\frac{1}{5}$ miles on Monday. He ran $1\frac{2}{5}$ miles on Tuesday. How far did he run both days?

## VOCABULARY

### TERMS

numerator
denominator
mixed number
improper fraction

---

### GETTING STARTED 1:

Prepare a set of flashcards, each with an addition or subtraction example involving fractions with like denominators. Place one flashcard on the chalkboard ledge.

e.g.

$$\boxed{\frac{2}{4} + \frac{1}{4} = \boxed{\phantom{00}}}$$

Ask a student to read the example. Say, "What do you notice about the denominators in this example? (The denominators are the same.) How do we add or subtract fractions when the denominators are the same? (We add or subtract the numerators and the denominator remains the same.) What is the sum of $\frac{2}{4}$ and $\frac{1}{4}$?" (The sum is $\frac{3}{4}$.)

Divide the class into two teams. Say, "We will use the remaining cards to practice adding and subtracting fractions with like denominators. Each time a member of your team correctly solves an example, your team will score one point." Play the game until each student has had a chance to participate.

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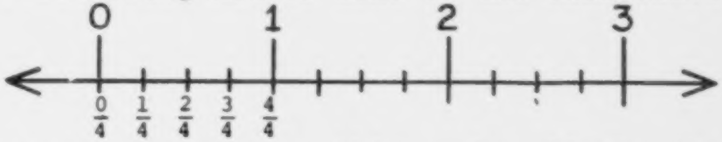
### GETTING STARTED 2:

Draw the following number line on the chalkboard:

e.g.,

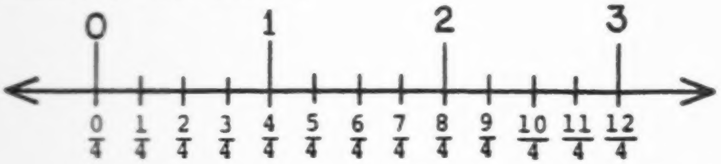


Say, "How can we count on this number line? (We can count by whole numbers above the line and by fractions below the line.) If we begin at $\frac{0}{4}$, how are we counting?" (We are counting by fourths.) Ask

## GETTING STARTED 2: (cont'd)

several students to complete the number line on the chalkboard by writing the missing fractions.

e.g.,



When the number line is complete, ask the students to count aloud by fourths through $\frac{12}{4}$. Say, "What is the mixed number equal to $\frac{6}{4}$?... equal to $\frac{11}{4}$? ($\frac{6}{4}$ equals $1\frac{2}{4}$. $\frac{11}{4}$ equals $2\frac{3}{4}$.) What improper fraction is equal to $1\frac{3}{4}$? ... $2\frac{1}{4}$?" ($1\frac{3}{4}$ equals $\frac{7}{4}$. $2\frac{1}{4}$ equals $\frac{9}{4}$.) How can we prove this on the number line?"

Repeat this procedure with number lines counting by halves and thirds.

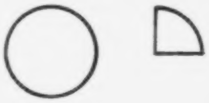
**4.06.06**

**4.06.06.01** **add mixed numbers with common denominators**

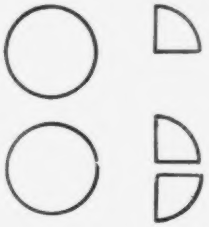
**STRATEGY 1:** Prepare and display flannel circles, flannel fractional parts, and a flannel board. On the chalkboard write an addition example involving mixed numbers having fractions with like denominators.
e.g.,

$$\begin{array}{r} 1\frac{1}{4} \\ +1\frac{2}{4} \\ \hline \end{array}$$

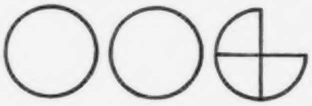
Say, "We will use the fractional parts to find the sum of these mixed numbers." Ask a student to read the first addend aloud and represent it on the flannel board using the fractional parts.
e.g.,



Ask another student to do the same with the second addend.
e.g.,



Say, "How can we find the total represented on the flannel board?" (We can put all the fourths together and all the wholes together.) Ask a student to put all the fourths together and all the wholes together.
e.g.,

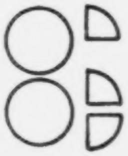


Say, "What kind of number is represented now? (A mixed number is represented.) How do we read this number?" (We read it as $2\frac{3}{4}$.) On the chalkboard write: $2\frac{3}{4}$.

**STRATEGY 1:**
cont'd

Say, "Look at the example on the chalkboard. What is the first addend?" (The first addend is $1\frac{1}{4}$.) Place a fractional representation of $1\frac{1}{4}$ next to this addend. Repeat this procedure with the second addend. Say, "We will add to see if the sum is the same as when we used the flannel fractional parts. When we add mixed numbers, we always begin by adding the fraction part of the mixed number. How much is $\frac{1}{4}$ plus $\frac{2}{4}$?" ($\frac{1}{4}$ plus $\frac{2}{4}$ equals $\frac{3}{4}$.) Ask a student to write $\frac{3}{4}$ in the sum in the example on the chalkboard.

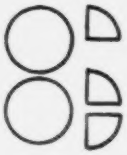
e.g.,



$$\begin{array}{r} 1\frac{1}{4} \\ +1\frac{2}{4} \\ \hline \square\frac{3}{4} \end{array}$$

Say, "Next we add the whole numbers. How much is 1 plus 1?" (1 plus 1 is 2.) Ask a student to write a 2 in the sum in the example on the chalkboard.

e.g.,



$$\begin{array}{r} 1\frac{1}{4} \\ +1\frac{2}{4} \\ \hline 2\frac{3}{4} \end{array}$$

Say, "What is the sum? (The sum is $2\frac{3}{4}$.) How does that compare with the sum when we used the flannel pieces to represent each mixed number?" (The sums are the same.) Ask the students to write the example in their notebooks. Say, "How do we add mixed numbers? (We add the fractions first. Then we add the whole numbers.) What part of the fraction must be the same for us to add?" (The denominators must be the same.)

Repeat this procedure for adding other mixed numbers with like denominators.

**4.06.06**

**4.06.06.02** **subtract mixed numbers with common denominators**

**TRATEGY 1:** Adapt Strategy 1, P.O. 4.06.06.01. Elicit from the students that both the whole number and the numerator of the top fraction, the minuend, must be larger than the whole number and the numerator of the bottom fraction, the subtrahend, in order to subtract.

**4.06.06.03** **solve words problems related to skills learned in this module**

**STRATEGY 1:** Prepare and display the following chart on the chalkboard:

**Melissa's Day**

| Activity | Time Spent |
|---|---|
| Sleeping | $8\frac{1}{4}$ hours |
| Eating | $2\frac{2}{4}$ hours |
| School | $6\frac{3}{4}$ hours |
| Playing | $1\frac{1}{4}$ hours |
| Watching T.V. | $2\frac{2}{4}$ hours |
| Studying | $1\frac{2}{4}$ hours |
| Reading | $1\frac{1}{4}$ hours |

Say, "What does this chart show? (The chart shows how Melissa spends her time each day.) What kind of numbers are written in the column labeled 'Time Spent'? (The hours are written as mixed numbers.) How can we find out how much time Melissa spent sleeping and watching television each day? (We can add the time Melissa spent sleeping to the time she spent watching television.) How much time did Melissa spend sleeping? (Melissa spent $8\frac{1}{4}$ hours sleeping.) How much time did Melissa spend watching television?" (Melissa spent $2\frac{2}{4}$ hours watching television.) Ask a student to write the algorithm on the chalkboard while the other students write in their notebooks.

**STRATEGY 1:** cont'd

e.g.,

$$\begin{array}{ll} 8\frac{1}{4} & \text{hours sleeping} \\ \underline{+2\frac{2}{4}} & \text{hours watching television} \end{array}$$

Say, "When we add mixed numbers, where do we begin? (We add the fractions first.) How much is $\frac{1}{4}$ plus $\frac{2}{4}$?" ($\frac{1}{4}$ plus $\frac{2}{4}$ equals $\frac{3}{4}$.) Ask a student to write $\frac{3}{4}$ under the appropriate column on the chalkboard.

e.g.,

$$\begin{array}{ll} 8\frac{1}{4} & \text{hours sleeping} \\ \underline{+2\frac{2}{4}} & \text{hours watching television} \\ \phantom{+2}\frac{3}{4} & \end{array}$$

Say, "Now let's add the whole numbers. How much is 8 plus 3?" (8 plus 3 equals 11.) Ask a student to write 11 under the appropriate column on the chalkboard.

e.g.,

$$\begin{array}{ll} 8\frac{1}{4} & \text{hours sleeping} \\ \underline{+2\frac{2}{4}} & \text{hours watching television} \\ 10\frac{3}{4} & \text{hours in all} \end{array}$$

Say, "How much time in all did Melissa spend sleeping and watching television?" (Melissa spent $10\frac{3}{4}$ hours sleeping and watching television.)

Repeat this procedure to add and subtract other mixed numbers. Use the chart to develop other story problems.

**Note:** In creating word problems from the chart, be aware that some combinations of addends will yield sums comprised of a whole number and an improper fraction.

**STRATEGY 2:** Write a story problem on a chart or on the chalkboard.

**STRATEGY 2:**
cont'd

e.g.,

On Monday $2\frac{5}{8}$ inches of rain fell. On Tuesday $1\frac{1}{8}$ inches of rain fell. How much more rain fell on Monday than on Tuesday?

Ask a student to read the story problem aloud. Say, "What do we know in this problem? (We know that $2\frac{5}{8}$ inches of rain fell on Monday. We know that $1\frac{1}{8}$ inches of rain fell on Tuesday.) What do we want to find out in this problem? (We want to find out how much more rain fell on Monday?) How can we solve this problem? (We can solve this problem by subtracting $1\frac{1}{8}$ from $2\frac{5}{8}$.) Why do we use subtraction?" (When we compare numbers or amounts, we subtract. In this problem we are comparing the amount of rainfall on Monday with the amount of rainfall on Tuesday.)

Ask a student to write the algorithm on the chalkboard as the other students write it in their notebooks.

e.g.,

$$\begin{array}{rl} 2\frac{5}{8} & \text{inches of rain} \\ \underline{-1\frac{1}{8}} & \text{inches of rain} \end{array}$$

Say, "When we subtract mixed numbers where do we begin? (We begin by subtracting the fractions.) How much is $\frac{5}{8}$ minus $\frac{1}{8}$?" ($\frac{5}{8}$ minus $\frac{1}{8}$ equals $\frac{4}{8}$.) Ask a student to write $\frac{4}{8}$ in the difference in the example on the chalkboard as the other students write it in their notebooks.

e.g.,

$$\begin{array}{rl} 2\frac{5}{8} & \text{inches of rain} \\ \underline{-1\frac{1}{8}} & \text{inches of rain} \\ \square\frac{4}{8} & \end{array}$$

**STRATEGY 2:** cont'd

Say, "Now, let's subtract the whole numbers. How much is 2 minus 1?" (2 minus 1 is 1.) Ask a student to write 1 in the appropriate column in the example on the chalkboard as the other students write it in their notebooks.

e.g.,

$$\begin{array}{rl} 2\frac{5}{8} & \text{inches of rain} \\ -1\frac{1}{8} & \text{inches of rain} \\ \hline 1\frac{4}{8} & \text{inches of rain} \end{array}$$

Say, "What is the difference? (The difference is $1\frac{4}{8}$.) What is the answer to the problem?" (There was $1\frac{4}{8}$ inches more rain on Monday.)

Repeat this procedure with other story problems to add and subtract mixed numbers.

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P.O. 4.06.06.01-.02

NAME:______________________________ CLASS:________ DATE:________

Complete each example. Use the code to discover the secret message.

①
$$\begin{array}{r} 3\frac{1}{5} \\ +\,2\frac{1}{5} \\ \hline 5\frac{2}{5} \end{array}$$

②
$$\begin{array}{r} 3\frac{4}{6} \\ -\,2\frac{2}{6} \\ \hline \end{array}$$

③
$$\begin{array}{r} 9\frac{3}{4} \\ -\,1\frac{1}{4} \\ \hline \end{array}$$

④
$$\begin{array}{r} 10\frac{5}{6} \\ -\,9\frac{3}{6} \\ \hline \end{array}$$

⑤
$$\begin{array}{r} 5\frac{1}{8} \\ +\,2\frac{3}{8} \\ \hline \end{array}$$

⑥
$$\begin{array}{r} 7\frac{3}{3} \\ -\,4\frac{1}{3} \\ \hline \end{array}$$

⑦
$$\begin{array}{r} 2\frac{2}{5} \\ +\,4\frac{1}{5} \\ \hline \end{array}$$

⑧
$$\begin{array}{r} 8\frac{8}{9} \\ -\,6\frac{4}{9} \\ \hline \end{array}$$

⑨
$$\begin{array}{r} 1\frac{1}{3} \\ +\,2\frac{1}{3} \\ \hline \end{array}$$

⑩
$$\begin{array}{r} 3\frac{1}{4} \\ +\,5\frac{1}{4} \\ \hline \end{array}$$

⑪
$$\begin{array}{r} 8\frac{9}{10} \\ -\,4\frac{1}{10} \\ \hline \end{array}$$

⑫
$$\begin{array}{r} 1\frac{3}{9} \\ +\,1\frac{1}{9} \\ \hline \end{array}$$

⑬
$$\begin{array}{r} 3\frac{4}{12} \\ +\,4\frac{6}{12} \\ \hline \end{array}$$

⑭
$$\begin{array}{r} 9\frac{6}{7} \\ -\,2\frac{1}{7} \\ \hline \end{array}$$

D
___ ___   ___ ___ ___ ___   ___ ___ ___ ___   ___ ___ ___ ___
1 2   3 4 5 6   7 8 9 10   11 12 13 14

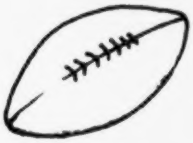
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $7\frac{4}{8}$ | $8\frac{2}{4}$ | $4\frac{8}{10}$ | $6\frac{3}{5}$ | $3\frac{2}{3}$ | $7\frac{5}{7}$ | $5\frac{2}{5}$ | $7\frac{10}{12}$ | $2\frac{4}{9}$ | $1\frac{2}{6}$ |
| U | Y | B | V | R | T | D | S | E | O |

P.O. 4.06.06.03

**NAME:** ____________________ **CLASS:** ________ **DATE:** ________

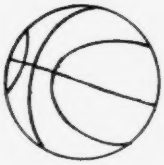
Follow the directions below.

A. Use the chart to solve each problem below.



**Time Spent at Sports**

| Name | Sport | Hours Spent |
|---|---|---|
| Ron | Baseball | $3\frac{1}{6}$ hours |
| Jack | Soccer | $6\frac{5}{6}$ hours |
| Mel | Football | $2\frac{3}{6}$ hours |
| Laura | Basketball | $4\frac{1}{6}$ hours |
| Jean | Handball | $5\frac{2}{6}$ hours |



1. How many hours did Laura and Ron spend playing ball?

________ hours

2. How many more hours did Jack play ball than Mel?

________ hours

3. How many hours did both Jean and Laura play ball?

________ hours

4. What is the difference between the time Jack played and the time Jean played?

________ hours

5. How much more time did Jean spend playing ball than Ron did?

________ hours

B. Solve each story problem.

1. Cindy walked $4\frac{3}{5}$ miles on Monday. She walked only $1\frac{1}{5}$ miles on Tuesday. How many more miles did she walk on Monday?

________ miles

2. Mother bought $7\frac{5}{8}$ yards of material for my dress. She bought $4\frac{2}{8}$ yards of material for my sister's dress. How much material did she buy in all?

________ yards

## 4.10.03 CUSTOMARY CAPACITY RELATIONSHIPS

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.10.03.01A identify and compare the number of ounces in a cup, a pint, and a quart;
e.g.,

1 cup (c.) = 8 ounces (oz.)
1 pint (pt.) = 16 ounces
1 quart (qt.) = 32 ounces

4.10.03.02A identify the relationships among cups, pints, quarts, and gallons;
e.g.,

2 cups = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon (gal.)

*4.10.03.03A use measuring skills to follow the directions in a recipe.
e.g.,

$\frac{1}{2}$ tbsp., $\frac{1}{4}$ cup

4.10.03

## VOCABULARY

| TERMS | SYMBOLS |
|---|---|
| ounce | oz. |
| cup | c. |
| pint | pt. |
| quart | qt. |
| gallon | gal. |

## GETTING STARTED 1:

Prepare and display a box of macaroni (elbows, small shells), a paper cup, a coffee mug, a measuring cup, and pint, quart, and gallon containers. Ask two students to come to the front of the room.

Say, "Carol was preparing the ingredients for macaroni and cheese. The recipe her friend gave her called for 2 cups of macaroni." Ask one student to pour macaroni into the paper cup while another student pours macaroni into the mug. Say, "Each student has filled one cup with macaroni. Do they each have the same amount? (No.) Why? (The cups are different in size.) What kind of cup do you think the recipe calls for? (The recipe calls for a measuring cup.) Yes, a measuring cup is always the same size." Display the measuring cup and say, "This measures one cup of an ingredient. All containers that measure one cup are the same size even if they have different shapes."

Discuss the need for standard units of measure. Ask the students to identify the pint, quart, and gallon containers as other standard units of measure. Say, "Which of these containers will hold the greatest amount? ...the least amount? (The gallon will hold the greatest amount. The cup will hold the least amount.) When would we use these measures?" (We would use them to measure liquids or some dry ingredients such as sugar, flour, rice, ...)

**4.10.03**

## GETTING STARTED 2:

Prepare and display a set of common household containers, e.g., yogurt container, sour cream container, half-and-half container, assorted milk containers, juice containers.

Say, "These are containers for things we often see in our homes or in the supermarket. What is sold in each container? What comes in the largest container? ...the smallest container?" How much will the largest container hold? ...the smallest container? (The largest container will hold one gallon. The smallest container will hold one cup.)

Draw 4 columns on the chalkboard and write a measure and its abbreviation at the top of each column

e.g.,

| cup (c.) | pint (pt.) | quart (qt.) | gallon (gal.) |
|---|---|---|---|
| | | | |

Say, "What items can be bought in one cup containers?" (Sour cream, heavy cream, ... can be bought in one cup containers.) List the responses in the appropriate column on the chalkboard.

Repeat this procedure for pint, quart, and gallon.

**4.10.03**

**4.10.03.01** **identify and compare the number of ounces in a cup, a pint, and a quart**

**STRATEGY 1:** Prepare and display a measuring cup, a pint container, and two quart containers, one empty and one filled with colored water.

Say, "We have discussed the value of having a standard unit for measuring capacity. What name did we give to the smallest unit? (The smallest unit is the ounce.) Look at this measuring cup. It has a capacity of one cup. Along the side are marked the number of ounces in a cup. Ask a student to read the number of units marked on the measuring cup. Say, "How many ounces are marked? (There are 8 ounces marked.) How many ounces are in a cup?" (There are 8 ounces in a cup.) On the chalkboard write: 1 cup = 8 ounces.

Say, "How can we find out how many ounces are in a pint?" (We use the cup container as many times as we need to fill the pint container. Every time we pour one cup of water into the pint container, we will count 8 ounces.) Ask a student to pour water from the quart container to the marking on the cup that measures 8 ounces and then to pour the 8 ounces of water into the pint container. Repeat the pouring until the pint container is filled with water. Say, "How many times did we pour 8 ounces into the pint container? (We poured 8 ounces into the pint container twice.) How much is 2 times 8 ounces?" (2 times 8 ounces equals 16 ounces.) On the chalkboard write: 1 pint = 16 ounces. Repeat this procedure to find the number of ounces in a quart and list the amount on the chalkboard. Ask the students to write the completed list in their notebooks. e.g.,

8 ounces = 1 cup
16 ounces = 1 pint
32 ounces = 1 quart

**4.10.03**

**STRATEGY 1:** cont'd

Say, "How many ounces are in a cup? ... a pint? ... a quart? (There are 8 ounces in a cup, 16 ounces in a pint, and 32 ounces in a quart.) How many more ounces are in a pint than in a cup? (There are 8 more ounces in a pint than in a cup.) How many more ounces are there in a quart than in a pint?" (There are 16 more ounces in a quart than in a pint.)

**4.03.02** **identify the relationship among cups, pints, quarts, and gallons**

**STRATEGY 1:** Prepare and display a large pitcher that will hold a gallon of liquid, a gallon container filled with colored water, a quart container, a pint container, and a cup container.

Say, "We have a gallon container filled with colored water. How many times do you think we can fill the quart container with this gallon of water? (Accept reasonable responses.) How can we find out how many quarts we can fill with a gallon of water?" (We can fill the quart, then empty the quart into the pitcher, and refill it again from the gallon container. We can do this until we use up the gallon of water.) Ask several students to take turns pouring carefully until all the water in the gallon container has been used. Say, "How many times did we fill the quart container from the gallon container?" (We filled the quart container 4 times with one gallon of water.) On the chalkboard write:
1 gallon = 4 quarts.

Say, "If 1 gallon equals 4 quarts, how many quarts will 2 gallons fill? ... 3 gallons fill?" (2 gallons will fill 8 quarts. 3 gallons will fill 12 quarts.)

Repeat this procedure, using the quart container to fill pints and cups, and a pint container to fill cups. Summarize on the chalkboard after each measure has been completed.

**4.10.03**

**STRATEGY 1:** cont'd

e.g.,

1 gallon = 4 quarts
1 quart = 2 pints
1 quart = 4 cups
1 pint = 2 cups

Ask the students to write the summary in their notebooks. Say, "If 1 quart equals 2 pints, how many pints are in 3 quarts? (There are 6 pints in 3 quarts.) How many cups are in 2 pints?" Continue using the chart on the chalkboard to expand the students' knowledge of equivalent measures.

**4.10.03.03** **use measuring skills to follow the directions in a recipe**

**STRATEGY 1:** Prepare and distribute copies of a recipe to each student. Omit the amount of each ingredient.
e.g.

### Party Punch

Ingredients:

- orange juice
- lemon juice
- cranberry juice
- pineapple juice
- apple cider
- ginger ale

Mix all ingredients well and serve with ice. Makes 2 gallons of punch.

Say, "The ingredients for this recipe sound very tasty, but there is something we don't know. What information is missing from our recipe? (We don't know how much of each ingredient is needed.) Suppose we need 32 ounces of orange juice. What is another way to write 32 ounces? (We can write 1 quart.) Is there another way we can express 32 ounces?" (We can think of it as 2 pints.) Ask the students to write an equivalent measure for 32 ounces next to the orange juice in their recipe. Say, "I will name the amount of each ingredient and you will write that amount a different way in your recipe."

**STRATEGY 1:** cont'd

Repeat this procedure with 8 ounces of lemon juice, 4 pints of cranberry juice, 32 ounces of pineapple juice, 2 quarts of apple cider, and 7 cups of ginger ale. When the students have written an equivalent amount for each ingredient, provide time for them to discuss the various ways of writing the stated amounts.

P.O. 4.10.03.01

NAME: ____________________ CLASS: ________ DATE: ______

Complete the table and use it to answer the problems below.

1 cup = ______ ounces

1 pint = ______ ounces

1 quart = ______ ounces

| | |
|---|---|
| 1. Jane's mother used 5 cups of water to make lemonade. How many ounces of water did she use?<br>______ oz. | 2. If a bottle contains 1 pint and 8 ounces of juice, how many ounces does it contain?<br>______ oz. |
| 3. How many ounces are in 1 quart and 1 pint of milk in all?<br>______ oz. | 4. Cindy needs to measure 3 pints of fruit juice. Her measuring cup only measures ounces. How many ounces does Cindy need to measure?<br>______ oz. |
| 5. How many ounces are in 2 quarts of milk?<br>______ oz. | 6. Mr. Belsen bought 1 quart and 4 ounces of soda. How many ounces of soda did he buy?<br>______ oz. |

## Do you remember?

Rewrite each group of decimals in order from least to greatest.

a. 2.7, 1.5, 2.9 ____, ____, ____

b. 4.6, 4.9, 4.7 ____, ____, ____

c. 5.21, 5.39, 5.1 ____, ____, ____

P.O. 4.10.03.02

NAME: ______________________ CLASS: ________ DATE: ______

Follow the directions below.

1. Complete the chart.

| | | | | | |
|---|---|---|---|---|---|
| Gallons | 1 | 2 | | 4 | |
| Quarts | 4 | | 12 | | 20 |

2. Complete the chart.

| | | | | | |
|---|---|---|---|---|---|
| Cups | 2 | | | | 10 |
| Pints | 1 | 2 | 3 | 4 | |

3. Write the missing numbers.

4 c. = ____ pt.

8 c. = ____ qt.

8 c. = ____ pt.

6 pt. = ____ qt.

2 gal. = ____ qt.

4 gal. = ____ qt.

2 qt. = ____ c.

6 pt. = ____ c.

4. Bobby watered his plants with 2 gallons of water. He only had a pint container. How many times did he fill it?

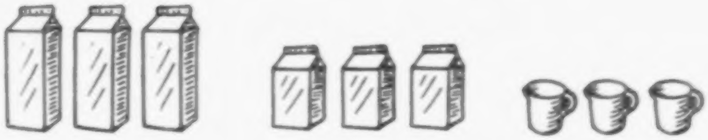
2 gallons = ____ pints

He filled the container _____ times.

5. Maggie has 3 quarts of milk. How many one cup containers can she fill?

She can fill ____ one cup containers.

CHALLENGE!



3 quarts + 3 pints + 3 cups = ________ ounces

# SHARPENING YOUR SKILLS

**Units 39, 40, 41**

**Name:** ____________________ Class: __________ Date: __________

1. $\frac{11}{5} = \square$

ⓐ $11\frac{1}{5}$　ⓒ $2\frac{1}{5}$

ⓑ $2\frac{1}{2}$　ⓓ Not Here

2. $\frac{7}{3} = \square$

ⓔ $2\frac{1}{3}$　ⓖ $2\frac{3}{7}$

ⓕ $7\frac{1}{3}$　ⓗ Not Here

3. $4\frac{1}{2} = \square$

ⓐ $\frac{9}{4}$　ⓒ $\frac{4}{2}$

ⓑ $\frac{9}{2}$　ⓓ Not Here

4. $3\frac{4}{5} = \square$

ⓔ $\frac{15}{5}$　ⓖ $\frac{12}{5}$

ⓕ $\frac{19}{4}$　ⓗ Not Here

5. Add.

$$\begin{array}{r} 2\frac{3}{5} \\ +4\frac{1}{5} \\ \hline \end{array}$$

6. Find the sum.

$$\begin{array}{r} 3\frac{1}{8} \\ +6\frac{5}{8} \\ \hline \end{array}$$

7. Find the difference.

$$\begin{array}{r} 5\frac{7}{8} \\ -3\frac{2}{8} \\ \hline \end{array}$$

8. Joan's recipe for cookies called for $2\frac{3}{4}$ cups of sugar. Philip's recipe needed $1\frac{2}{4}$ cups of sugar . How much more sugar did Joan's recipe need than Philip's?

ⓐ $1\frac{2}{4}$ cups　ⓒ 1 cup

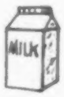
ⓑ $1\frac{1}{4}$ cups　ⓓ Not Here

9. Complete the chart.

1 cup = _____ ounces
1 pint = _____ cups
1 quart = _____ pints
1 gallon = _____ quarts

10.

1 quart



1 pint

How many ounces of milk are there in all?

__________ ounces

## 4.09.05 PARALLELOGRAMS

(1-2 lessons)

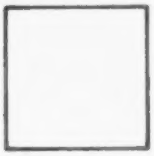
### PERFORMANCE OBJECTIVES

The student will be able to...

4.09.05.01B define a parallelogram as a quadrilateral in which the opposite sides are parallel;
e.g.,

4.09.05.02B define a square and a rectangle as parallelograms;
e.g.,

square

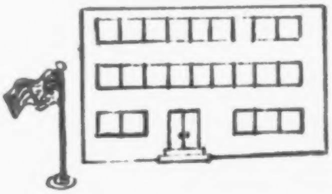


4 right angles,
4 equal sides,
opposite sides
parallel.

rectangle

4 right angles,
opposite sides
equal and parallel.

4.09.05.03B recognize parallelograms in the environment.
e.g.,



**4.09.05**

## VOCABULARY

### TERMS

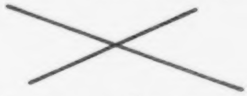
parallel
parallelogram
perpendicular
quadrilateral

---

## GETTING STARTED 1:

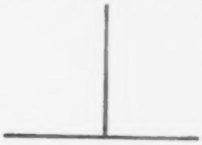
Prepare and distribute several pipe cleaners or narrow strips of paper to each student or pair of students. Say, "These pipe cleaners will represent line segments. Use two pipe cleaners to represent intersecting line segments."

e.g.,



Repeat this procedure for parallel lines segments and perpendicular line segments.

e.g.,



Now use your pipe cleaners to construct a triangle and a rectangle. In how many places do the line segments intersect in a triangle? ...rectangle? (The line segments intersect in 3 places in a triangle and 4 places in a rectangle.) Which figure has parallel lines?" (The rectangle has 2 pairs of parallel lines.)

Draw 3 columns on the chalkboard. Label the columns **Intersecting Lines or Segments**, **Perpendicular Lines or Segments**, and **Parallel Lines or Segments**, respectively. Say, "Where can we find representations of intersecting lines or line segments in our classroom?" List each response on the chalkboard in the appropriate column.

e.g.,

| Intersecting Lines or Segments | Perpendicular Lines or Segments | Parallel Lines or Segments |
|---|---|---|
| the letter x | | |
| the letter v | | |

Repeat this procedure for perpendicular lines or segments and parallel lines or segments.

**GETTING STARTED 1:** cont'd

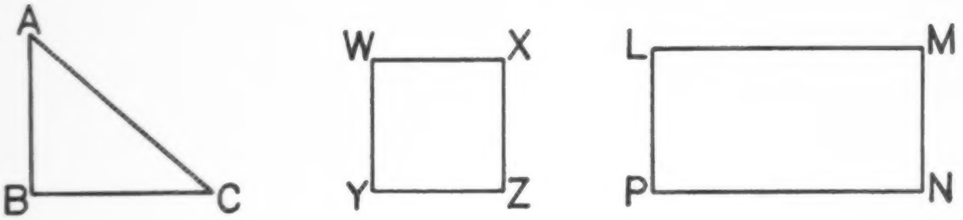
| Intersecting Lines or Segments | Perpendicular Lines or Segments | Parallel Lines or Segments |
|---|---|---|
| the letter x | the letter T | opposite side of bulletin board |
| the letter v | the letter L | blue lines on pages in notebook |

---

**GETTING STARTED 2:**

Display a group of shapes with labeled vertices.

e.g.,



Point to the triangle. Say, "How many sides does a triangle have? (A triangle has three sides.) How many angles are contained within the triangle? (There are 3 angles in a triangle.) Which sides are perpendicular to each other? (Side AB is perpendicular to side BC.) Do all triangles have a pair of perpendicular line segments? (No.) Why not? (A triangle will have a pair of perpendicular line segments only if it also has a right angle.) How many vertices does a triangle have?" (A triangle has 3 vertices.)

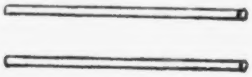
Repeat this procedure for the other shapes. Ask the students to describe the characteristics of each shape.

4.09.05

4.09.05.01 **define a parallelogram as a quadrilateral in which the opposite sides are parallel**

**STRATEGY 1:** Prepare and distribute three straws, a pair of scissors, and tape to each student or group of students. Ask the students to fold and cut one straw in half.

Say, "Each of you now has four straws, 2 longer and 2 shorter. Place the long straws in the middle of your desk so they represent parallel lines."
e.g.,



Now move the top straw a little to the right and the bottom straw a little to the left." Demonstrate this by drawing a picture on the chalkboard.
e.g.

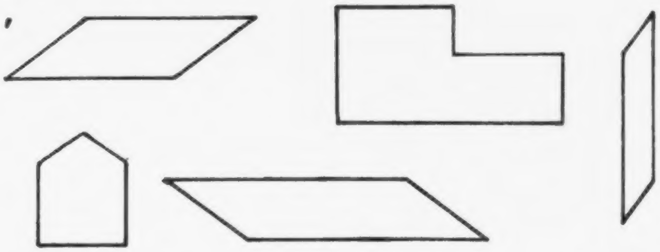
Say, "We will use these straws to make a figure called a parallelogram. What is the root word in the word parallelogram? (The root word is parallel.) This figure we will make is called a parallelogram because the top and bottom lines are parallel to one another and the left and right sides are parallel to one another. Use your smaller straws to connect the top and bottom lines. Take four small pieces of tape and tape the straws together in each corner. This figure is a parallelogram." Connect the parallel lines on the chalkboard.
e.g.,

Say, "How many sides does a parallelogram have? (It has 4 sides.) What name do we give to any 4-sided figure? (They are called quadrilaterals.) What is special about

**STRATEGY 1:** cont'd

this type of quadrilateral? (Its opposite sides are parallel.) How many angles are there in a parallelogram?" (There are 4 angles in a parallelogram.) Write on the chalkboard and say, "A parallelogram is a quadrilateral in which the opposite sides are parallel." Ask the students to read the definition and write it in their notebooks. Ask the students to draw a picture of a parallelogram in their notebooks. Draw several shapes on the chalkboard and ask the students to draw a ring around the figures that are parallelograms.

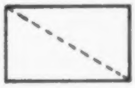
e.g.,



**STRATEGY 2:**

Prepare and distribute a ruler, a pair of scissors, and a rectangular piece of paper to each student or pair of students. Ask the students to use the ruler to draw a dotted line from one corner of the rectangle to its opposite corner.

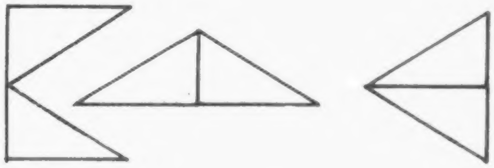
e.g.,



Ask the students to cut along the dotted line.

Say, "Before you cut on the dotted line, what shape was the paper? (The paper was a rectangle.) When you cut along the dotted lines what new shapes did you form? (The two new shapes are triangles.) Let's see what other shapes we can make. As you make each one, draw a picture of it in your notebook."

e.g.,



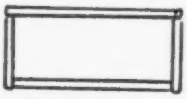
**STRATEGY 2: cont'd** Draw a large parallelogram on the chalkboard.
e.g.,

Say, "Did anyone make this shape with his or her triangles?" Ask all the students to form this shape with their triangles.

Say, "This figure is special. It is called a parallelogram. How many sides does a parallelogram have? (It has 4 sides.) What do we call all 4-sided figures? (Figures with 4 sides are called quadrilaterals.) What do you notice about the opposite sides of the parallelogram? (The opposite sides are equal in length.) What else do you notice about the opposite sides?" (The opposite sides are parallel to each other.) Write on the chalkboard and say, "A parallelogram is a special kind of quadrilateral whose opposite sides are parallel." Ask the students to read the definition and write it in their notebooks along with a picture of a parallelogram.

**4.09.05.02** **define a square and a rectangle as parallelograms**

**STRATEGY 1:** Prepare materials as in Strategy 1, P.O. 4.09.05.01. Ask the students to use the 2 long straws and 2 short straws to form a rectangle.
e.g.,



Say, "Tape all the sides together in the corners. What kind of figure did you make? (We made a rectangle.) Look at the two long straws. What can we say about the long straws? (They are equal in length.) What kind of line segments are they? (They are parallel line segments.) What do you notice about the 2 short sides? (They are also equal in length and parallel.) When we learned about a parallelogram, what did we say about its

**STRATEGY 1: cont'd**

opposite sides? (The opposite sides of a parallelogram are parallel.) Since rectangles have opposite sides that are parallel, we can say that rectangles are special parallelograms."

Repeat the above procedure using four short straws to show that squares are also parallelograms.

**4.09.05.03 recognize parallelograms in the environment**

**STRATEGY 1:** Prepare and display a large picture of a building. Say, "This building could be a school, or someone's house, or a factory. Let's make believe it is a school. Inside the school, what shape are the doors? (The doors are rectangles.) What shape are the windows? (Windows are squares or rectangles.) What type of figures did we say that squares and rectangles are? (They are all parallelograms.) Ask the students to name some objects in the room that are parallelograms, e.g., a sheet of paper, the surface of a desk, ...

Review the students' responses and elicit that almost every parallelogram found in the environment is either a rectangle or a square. Say, "Did anyone think of something that is a parallelogram, but not a rectangle or square?" Provide time for the students to discuss their responses.

P.O. 4.09.05.01-.02

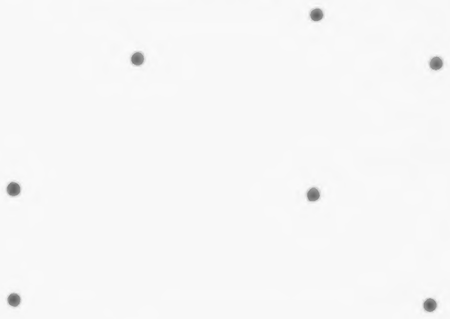
NAME:________________________________ CLASS:________ DATE:______

Follow the directions below.

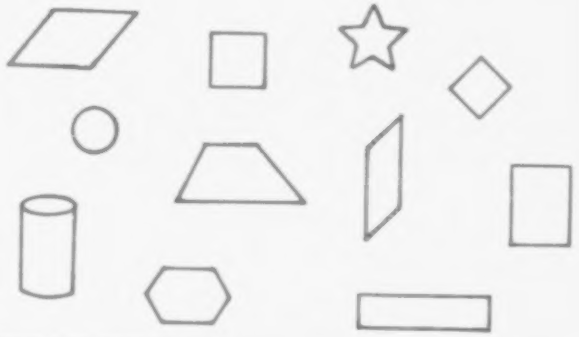
Complete the sentence below.

A parallelogram is a quadrilateral whose ______________ sides are ________________.

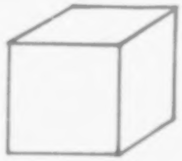
1. Connect 4 dots to make a parallelogram.



2. Circle the parallelograms.



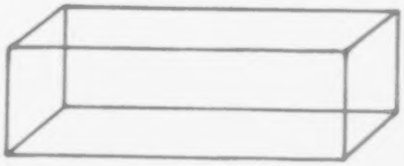
3.



How many parallelograms can you see? ________

How many are hidden? ________

4.



How many parallelograms can you find?

________

5. Circle the objects shaped like a parallelogram.

the sun

a door

a lemon

a box top

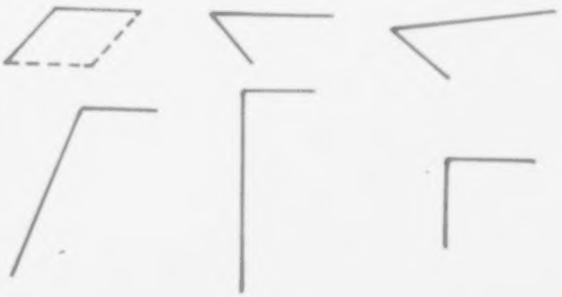
a lobster

a picture frame

a desk top

a bridge

6. Make each picture below into a parallelogram.



## 4.10.04 PERIMETERS

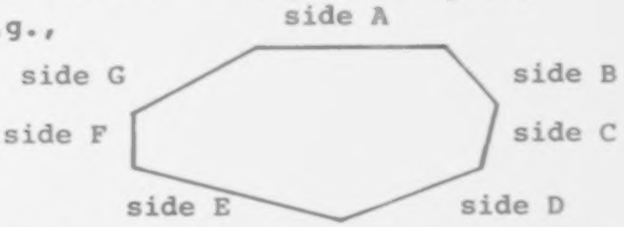
(1 lesson)

### PERFORMANCE OBJECTIVES

The student will be able to...

*4.10.04.01A identify perimeter as the total distance around the sides of an object or space;

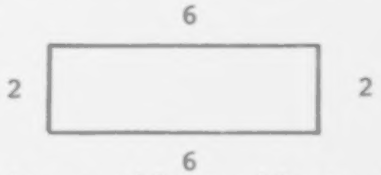
e.g.,


side A
side G
side B
side F
side C
side E
side D

Perimeter = side A + side B + side C +
side D + side E + side F + side G

4.10.04.02A find the perimeter of a rectangle;

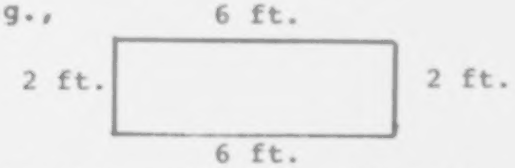
e.g.,



Perimeter = side + side + side + side
Perimeter = 6 + 6 + 2 + 2
Perimeter = 16

4.10.04.03B develop and use a formula for finding the perimeter of a rectangle.

e.g.,


6 ft.
2 ft.
2 ft.
6 ft.

Perimeter = (2 x length) + (2 x width)
Perimeter = (2 x 6 in.) + (2 x 2 in.)
Perimeter = 12 in. + 4 in.
Perimeter = 16 in.

4.10.04

## VOCABULARY

### TERMS

perimeter
length
width

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### GETTING STARTED 1:

Prepare and distribute geoboards and rubber bands to each student or group of students. Say, "Use your rubber bands to make a 3-sided figure on the geoboard. What is the name of that figure?" (A 3-sided figure is called a triangle.) Ask the students to compare their triangles with those of other students. Say, "How are the triangles the same? (They all have 3 sides and 3 angles.) How are they different?" (The sides are different lengths. Some of the triangles have one right angle.) Repeat this procedure with 4-, 5-, and 6-sided figures. Ask the students to count the sides of the figures created by their classmates. A chart may be created to show the relationship between the number of angles and the number of sides.
e.g.,

| figure | number of sides | number of angles |
|---|---|---|
| △ | 3 | 3 |
| □ | 4 | 4 |
| ⬠ | 5 | 5 |
| ⬡ | 6 | 6 |

Elicit from the students that the number of sides a figure has is equal to the number of angles it has.

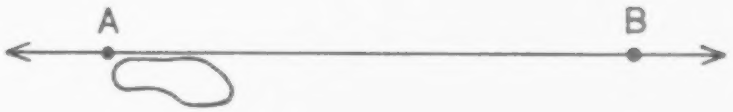
---

### GETTING STARTED 2:

Prepare a pattern of an adult's foot and a pattern of a child's foot to be used as units of measure. Draw line segment AB on the chalkboard. Measure its length using the pattern of the adult's foot as the unit of measure.

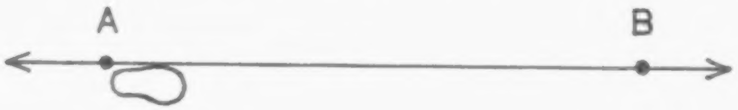
GETTING STARTED 2: cont'd

e.g.,



Ask a student to come to the chalkboard and measure the length of the line segment using the pattern of the child's foot as the unit of measure.

e.g.,



Compare the results of both measurement activities. Say, "Why are the results different? (The results are different because we used different units of measure.) Which other units of measure could we have used? (We could have used a customary unit of measure such as an inch or a foot, or could have used a metric unit of measure such as a centimeter or a meter.) How will the measurements compare if several students use the centimeter as the unit of measure?" (If several students use a standard unit of measure such as the centimeter, then the measurements will all be the same.)

Ask a student to come to the chalkboard to measure the length of the line segment using the centimeter ruler. Ask two other students to repeat the activity and compare the results.

**4.10.04**

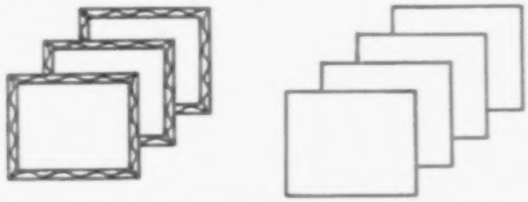
**4.10.04.01** **identify perimeter as the total distance around the sides of an object or space**

STRATEGY 1: Prepare and distribute geoboards and rubber bands to each student or group of students. Say, "Make the smallest square possible on your geoboard. How many sides does a square have?" (A square has four equal sides.) Ask the students to place a finger at one corner of the square and trace around the square. Say, "When you traced the square with your finger, how many sides did you trace? (I traced all 4 sides.) You have just traced around the perimeter of the square." Write on the chalkboard and say, "The total distance around the sides of an object or space is called the perimeter." Ask the students to write this definition in their notebooks.

Say, "Make the largest square you can on the geoboard. Trace around the perimeter of this square. How many sides did you trace? (I traced all four sides.) What do we call the distance around the square? (We call the distance around the square the perimeter.) Which square do you think has the greater perimeter? (The larger square has the greater perimeter.) How do you know?" (Each side is longer.) Repeat this procedure by asking the students to construct other polygons, e.g., hexagons, rectangles, triangles, ... Say, "What is the name we give to the total distance around the outside of each figure? (The perimeter is the total distance around the outside of the figure.) How could we measure the perimeter?" (We could measure each side and add all the measurements. This will tell us the total distance around the figure.)

**STRATEGY 2:** Prepare and display pieces of construction paper some of which are framed with a border. Ask a student to sort the pieces into two groups.

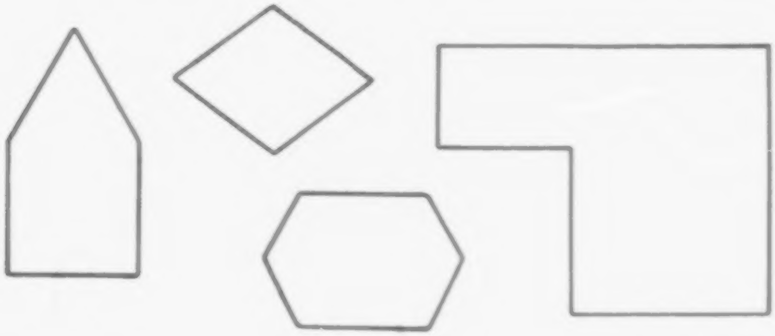
e.g.,



Say, "Why did you sort them this way? (Some papers have frames and some do not.) If we wanted to construct frames for the unframed papers, what part of the paper would we have to measure?" (We would have to measure the distance around the edge of the paper.) Ask a student to trace around the edge of one of the papers with his/her finger. Say, "We call the distance around an object or space, the perimeter." Write this definition on the chalkboard and ask the students to write it in their notebooks.

Draw several other polygons on the chalkboard.

e.g.,



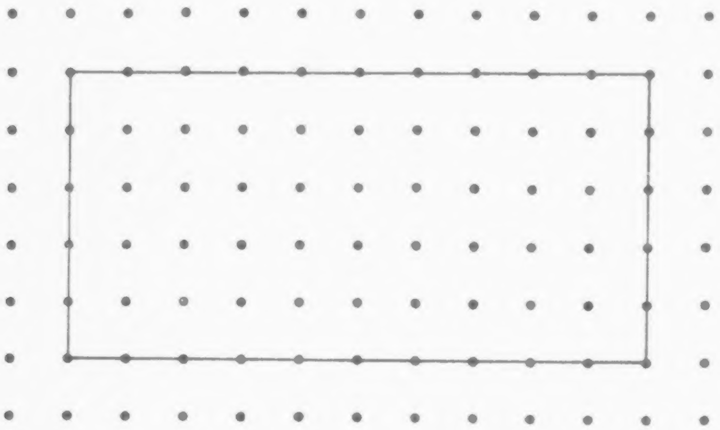
Say, "How could we measure the perimeter of each figure?" (We could measure each side and add all the measurements.) Ask the students to identify the perimeter of each figure by tracing it with their fingers.

**4.10.04**

**4.10.04.02** **find the perimeter of a rectangle**

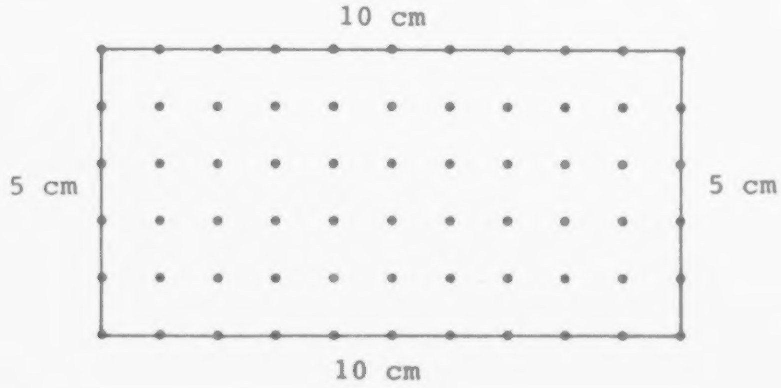
**STRATEGY 1:** Prepare and distribute a sheet of one centimeter dot paper to each student. (See Resource Material.) Demonstrate at the chalkboard or on an overhead projector how to contruct a rectangle which is 10 cm long and 5 cm wide on the dot paper.

e.g.,



Say, "How can we find the perimeter of this rectangle?" (We can measure the distance around the figure.) How can we measure the distance around the figure?" (We know the measurement of each side, so we can add all the measurements.) Ask the student to label the length of each side.

e.g.,



90

**STRATEGY 1:** cont'd

Ask a student to add the measurements at the chalkboard as the other students work in their notebooks.

e.g.,

Perimeter = 10 cm + 5 cm + 10 cm + 5 cm
Perimeter = 30 cm

Say, "What is the measure of the perimeter? (The perimeter is 30 cm.) What does that tell us?" (It tells us that the distance around the entire rectangle is 30 cm.)

Repeat this procedure using other rectangles drawn on dot paper.

**STRATEGY 2:** Prepare several rulers. Say, "Today we will search for objects in the room which are rectangular in shape." Ask several students to come to the chalkboard to list objects which have rectangular shapes.

e.g.,

Rectangular Shapes

1. window pane
2. pictures
3. desk top
4. door
5. chalkboard

Say, "How can we find the perimeter of the window pane?" (We can measure all the sides and add them.)

Separate the students into groups, distribute a ruler to each group, and ask them to find the perimeter of one of the listed items. Say, "How is each group working in the same way? (Everyone is finding the perimeter of a rectangular figure by measuring the sides and adding them.) What do you know about the opposite sides of a rectangle? (The opposite sides of a rectangle are equal.) Must you measure all 4 sides? (No. If we know the measure of a long side and a short side, we know the measure of the

**STRATEGY 2:** cont'd

other 2 sides as well.) Why?" (The opposite sides of a rectangle are equal.) When the perimeter of each object has been found, ask a student from each group to demonstrate at the chalkboard how his/her group found the perimeter of the rectangular object they measured.

**4.10.04.03** **develop and use a formula for finding the perimeter of a rectangle**

**STRATEGY 1:** Prepare and distribute rulers to each group of students. Divide the class into groups. Ask the students to name various items in the classroom which are rectangular in shape. Say, "We want to find the perimeter of these objects." Draw a table on the chalkboard.

e.g.,

| Object | Length | Width |
|---|---|---|
| | | |

Ask each group to choose one of the rectangular objects and measure its sides. Say, "Instead of saying 'the sides of the rectangle', we will use the terms 'length' and 'width' to describe our measures." Ask a member of each group to list the name of the object they measured and its length and width.

e.g.,

| Object | Length | Width |
|---|---|---|
| bulletin board | 4 ft. | 3 ft. |

**STRATEGY 1:** cont'd

Say, "Knowing this information, we can find the perimeter of each rectangular object. We have learned that we can add all the sides to find the perimeter. For a rectangle, we can use a formula to find the perimeter." Write the following on the chalkboard:

Perimeter = length + width + length + width

Say, "We can rewrite this formula a shorter way. Instead of adding the length twice, we can multiply the length by 2. Instead of adding the width twice, we can multiply the width by 2. Then we can add the products together." On the chalkboard write:

Perimeter = (2 x length) + (2 x width)

Say, "A shorter way to write the formula is to use the letter "l" to represent the length and to use the letter 'w' to represent the width." On the chalkboard write:

Perimeter = (2 x l) + (2 x w)

Ask the students to write the formula in their notebooks and use it to find the perimeter of each object listed on the chalkboard.

e.g.,

Perimeter of the Bulletin Board

Perimeter = (2 x length) + (2 x width)
Perimeter = (2 x 4 ft.) + (2 x 3 ft.)
Perimeter = 8 ft. + 6 ft.
Perimeter = 14 ft.

P.O. 4.10.04.01-.02

NAME: ______________________ CLASS: ________ DATE: _______

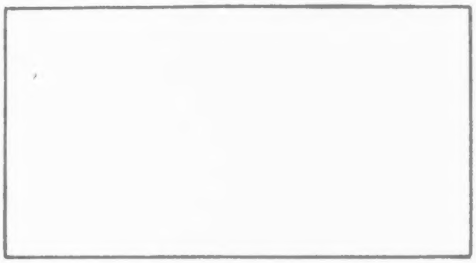
Follow the directions below.

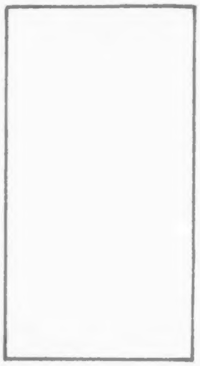
A. Draw a ring around the correct word to complete each sentence.

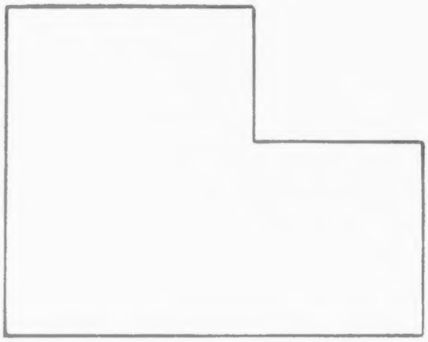
1. You can find the perimeter of a figure by adding multiplying the lengths of all the sides.

2. The distance around a figure is its centimeters perimeter .

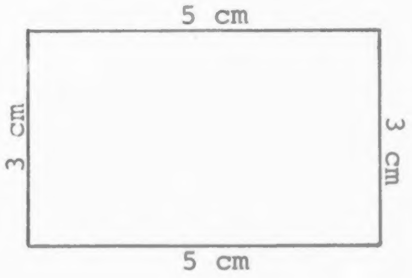
B. Use a crayon to trace the perimeter of each figure.

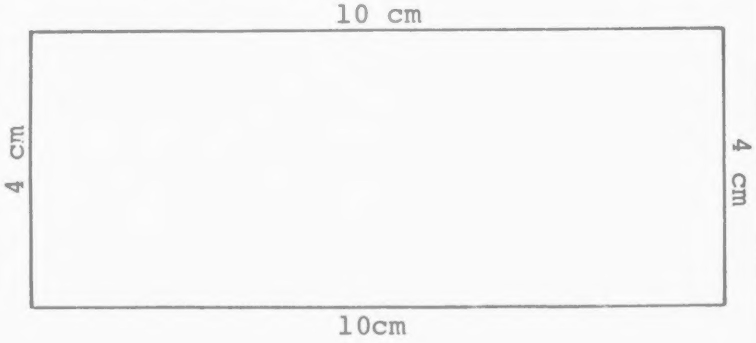






C. Find the perimeter of each rectangle.





Perimeter = 5+3+5+3=16cm

Perimeter = ______________

D. Use a ruler to find the perimeter of this page.

______________________

P.O. 4.10.04.03

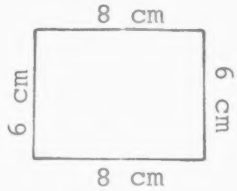
**NAME:** ______________________ **CLASS:** ________ **DATE:** ________

Follow the directions below.

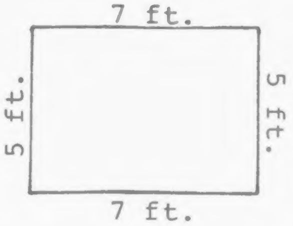
A. Write the formula used to find the perimeter of a rectangle.

Perimeter = ______________________

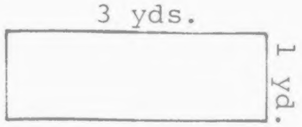
B. Use the formula to find the perimeter of each rectangle below.


8 cm
6 cm
6 cm
8 cm

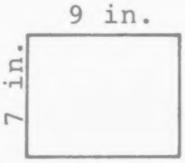
Perimeter = ____________


7 ft.
5 ft.
5 ft.
7 ft.

Perimeter = ____________

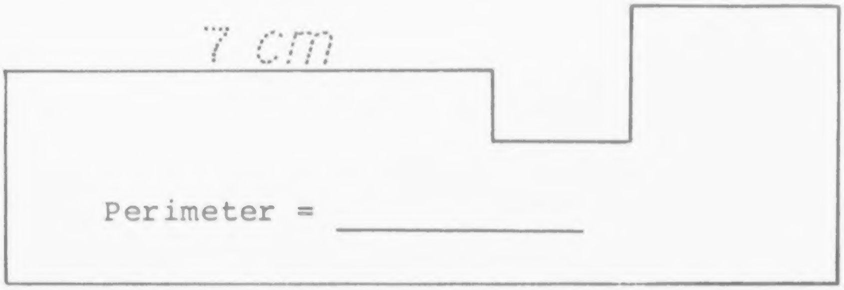


Perimeter = ____________



Perimeter = ____________

**CHALLENGE!** Use a ruler to find the perimeter of the polygon below.



Perimeter = ____________

## 4.05.04 THE DISTRIBUTIVE PROPERTY OF DIVISION

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.05.04.01B identify the distributive property of division over addition or subtraction and express the remainder as a fraction;

e.g.,

$$48 \div 5 = \frac{48}{5} = \frac{45+3}{5} = \frac{45}{5} + \frac{3}{5} = 9 + \frac{3}{5} = 9\frac{3}{5}$$

$$48 \div 5 = \frac{48}{5} = \frac{50-2}{5} = \frac{50}{5} - \frac{2}{5} = 10 - \frac{2}{5} = 9\frac{3}{5}$$

4.05.04.02B divide a 2- or 3-digit number by a 1-digit divisor without regrouping using the distributive property of division over addition.

e.g.,

$$3\overline{)36}$$

$$\begin{array}{r} 1\text{ ten} + 2\text{ ones} \\ 3\overline{)3\text{ tens} + 6\text{ ones}} \end{array} = 12$$

Therefore, $\begin{array}{r} 12 \\ 3\overline{)36} \end{array}$.

## VOCABULARY

### TERMS

distributive property

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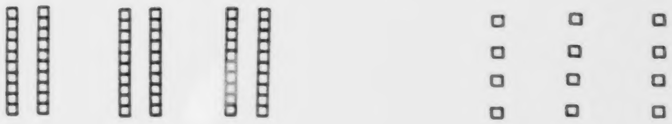
### GETTING STARTED 1:

Prepare and distribute squared material (tens and ones) to each student or group of students. On the chalkboard write: 3 x 24. Say, "How can we use the distributive property of multiplication over addition to find the product of 3 x 24? (We can express 24 in expanded form. Then we can multiply each part and add the two products together for the final product.) Show 24 using your squared material. How did you represent 24? (We used 2 tens and 4 ones.) What name for 24 does this represent?" (It represents 20 + 4.) On the chalkboard write: 3 x 24 = 3 x (20 + 4). Say, "Using the distributive property, how shall we multiply? (We shall multiply 3 times 20 and then 3 times 4.) Yes, both parts of 24 must be multiplied by the 3." Write the following on the chalkboard:

$$\begin{aligned} 3 \times 24 &= 3 \times (20 + 4) \\ &= (3 \times 20) + (3 \times 4) \end{aligned}$$

Say, "Use your squared material to show the multiplication."
e.g.,



Say, "How much is 3 times 20? (3 times 20 equals 60.) How much is 3 times 4?" (3 times 4 equals 12.) Write the following on the chalkboard:

$$\begin{aligned} 3 \times 24 &= 3 \times (20 + 4) \\ &= (3 \times 20) + (3 \times 4) \\ &= \quad 60 \quad + \quad 12 \end{aligned}$$

Say, "What must we do next? (We must add 60 and 12.) How much is 60 plus 12?" (60 plus 12 equals 72.) Complete the expression on the chalkboard.

**GETTING STARTED 1:** cont'd

e.g.,

$$\begin{aligned} 3 \times 24 &= 3 \times (20 + 4) \\ &= (3 \times 20) + (3 \times 4) \\ &= 60 + 12 \\ &= 72 \end{aligned}$$

Repeat this procedure using other numbers to demonstrate the distributive property of multiplication over addition.

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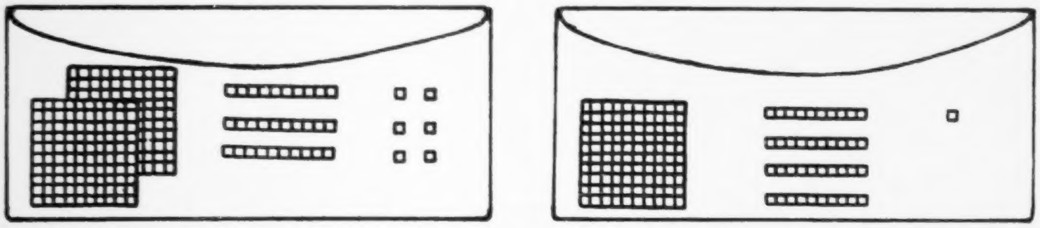
**GETTING STARTED 2:**

Prepare and distribute several envelopes, each containing different amounts of squared material (hundreds, tens, and ones) to each group of students.

e.g.,



Say, "Open one of your envelopes and place the squared material on your desk. Write the amount represented by the squared material in both expanded form and standard form in your notebook."

e.g.,

2 hundreds + 3 tens + 6 ones = 236
200 + 30 + 6 = 236

1 hundred + 4 tens + 1 one = 141
100 + 40 + 1 = 141

Ask a student from each group to describe his/her squared material and state the number in standard form.

Ask the groups to replace the squared material into the envelopes and trade envelopes with another group to repeat the procedure.

98

**4.05.04**

**4.05.04.01** **identify the distributive property of division over addition or subtraction and express the remainder as a fraction**

**STRATEGY 1:** Say, "We have learned about the distributive property of multiplication. Today we will learn about the distributive property of division over addition or subtraction. Say, "Pretend you have 48 marbles in a bag. They are to be shared equally among five students. How would you find out how many marbles each student would receive? (We would divide.) Can you divide 48 by 5 evenly? (No.) What number close to 48, but not greater than 48, is divisible by 5? (45 is close to, but not greater than, 48 and is divisible by 5.) 45 plus 3 is another name for 48 that will make it easier for us to divide 48 by 5." On the chalkboard write:

$$48 \div 5 = \frac{48}{5} = \frac{45 + 3}{5}$$

Say, "How are the numbers on each side of the equal symbol the same? (They each mean 48 ÷ 5.) We must divide both the 45 and the 3 by 5." On the chalkboard, continue the expression.
e.g.,

$$48 \div 5 = \frac{48}{5} = \frac{45 + 3}{5} = \frac{45}{5} + \frac{3}{5}$$

Say, "Now, we can divide each part by 5. How much is 45 divided by 5? (45 divided by 5 is 9.) We cannot divide 3 by 5, so we will leave it as the fraction $\frac{3}{5}$. It is another way of representing a remainder of 3. This remainder cannot be divided by 5. Complete the expression on the chalkboard.
e.g.,

$$48 \div 5 = \frac{48}{5} = \frac{45 + 3}{5} = \frac{45}{5} + \frac{3}{5} = 9 + \frac{3}{5} = 9\frac{3}{5}$$

Say, "This is called the distributive property of division over addition. What is the quotient? (The quotient is $9\frac{3}{5}$.) What is the answer to the problem?"

**4.05.04**

**STRATEGY 1:** cont'd

(Each student would receive 9 marbles and there would be 3 marbles left over.) Repeat this procedure, renaming 48 using subtraction.

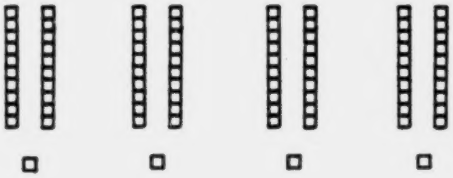
e.g.,

$$48 \div 5 = \frac{48}{5} = \frac{50 - 2}{5} = \frac{50}{5} - \frac{2}{5} = 10 - \frac{2}{5} = 9\frac{3}{5}$$

**4.05.04.02** **divide a 2- or 3- digit number by a 1-digit divisor without regrouping using the distributive property of division over addition**

**STRATEGY 1:** Prepare and distribute squared material (hundreds, tens, and ones) to each student or group of students. Ask the students to use their squared material to show 84. Say, "How did you represent 84 using your squared material? (We used 8 tens and 4 ones.) Separate the model of 84 into 4 equal groups."

e.g.,



Say, "How did you begin to separate the model? (I began by separating the tens and the ones.) When you separated 84 into 4 equal groups how much did you put into each of the 4 groups? (Each of the four groups has 21.) How can we show that model as a number story? (84 divided by 4 equals 21.) On the chalkboard, write: $4\overline{)84}$. Say, "We separated the 84 into 8 tens, or 80 and 4 ones, or 4. We can write the example another way." On the chalkboard, write:

$$4\overline{)8 \text{ tens} + 4 \text{ ones}}$$

Say, "When we used the squared material, we divided the tens and then the ones. Where do we begin to divide in the algorithm? (We begin by dividing the tens.)

**STRATEGY 1:** cont'd

How much is 8 tens divided by 4?" (8 tens divided by 4 equals 2 tens.) Ask a student to write "2 tens" in the quotient. Say, "How much is 4 ones divided by 4?" (4 ones divided by 4 equals 1 one.)
Ask a student to write "1 one" in the quotient.
e.g.,

$$\begin{array}{r} 2 \text{ tens} + 1 \text{ one} \\ 4\overline{)8 \text{ tens} + 4 \text{ ones}} \end{array}$$

Say, " How much is 2 tens and 1 one?" (2 tens and 1 one equals 21.) Complete the example on the chalkboard.
e.g.,

$$\begin{array}{l} \;\;\;2 \text{ tens} + 1 \text{ one} = 21 \\ 4\overline{)8 \text{ tens} + 4 \text{ Ones}} \end{array}$$

Repeat this procedure with other 2- and 3-digit numbers. Remind the students to begin with the hundreds place when dividing a 3-digit number.

P.O. 4.05.04.01

NAME: ______________________ CLASS: __________ DATE: ________

Complete each division sentence by writing the missing digit in the empty boxes.

A. $$38 \div 4 = \frac{38}{4} = \frac{36 + \square}{4} = \frac{36}{\square} + \frac{2}{\square} = 9 + \frac{2}{4} = \square$$

B. $$38 \div 4 = \frac{38}{4} = \frac{40 - 2}{\square} = \frac{\square}{4} - \frac{2}{4} = 10 - \frac{2}{4} = 9\frac{2}{4}$$

C. $$28 \div 3 = \frac{28}{3} = \frac{27 + \square}{\square} = \frac{27}{3} + \frac{\square}{3} = 9 + \frac{1}{3} = \square$$

D. $$28 \div 3 = \frac{28}{3} = \frac{30 - \square}{3} = \frac{30}{\square} - \frac{\square}{3} = 10 - \frac{\square}{3} = 9\frac{1}{3}$$

In example A, 38 is being divided into $\square$ equal groups. The answer shows that each of the four groups has $\square$ and that 2 is a remainder.

In example C, 28 is being divided into $\square$ groups. The answer shows that each of the $\square$ groups has $\square$ and that $\square$ is a remainder.

**CHALLENGE!** Can you use the digits 2, 3, 5, and 7, once in each box, so the product will be 3,661?

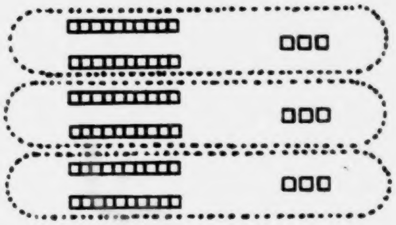
$$\begin{array}{r} \square\,\square\,\square \\ \times \qquad \square \\ \hline \end{array}$$

P.O. 4.05.04.02

NAME: ______________________ CLASS: ________ DATE: ______

Follow the directions below.

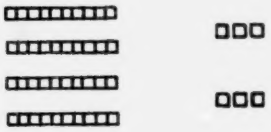
A. Separate the squared material into 3 equal groups.



2 tens + 3 ones = 23

3 ) 6 tens + 9 ones

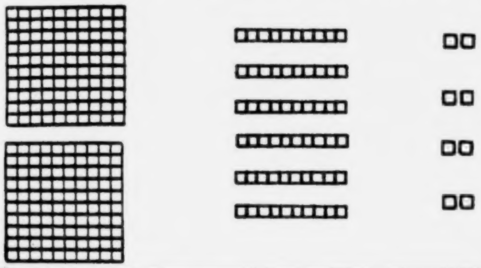
B. Separate the squared material into 2 equal groups.



= ___

2 ) 4 tens + 6 ones

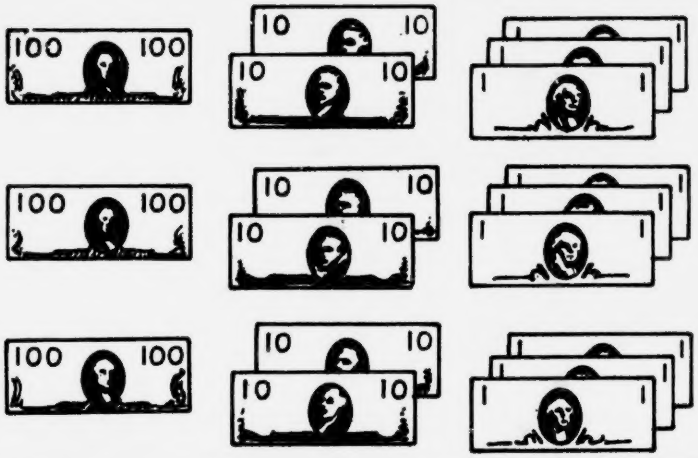
C. Separate the squared material into 2 equal groups.



= ___

) ____________________

D. Divide the money equally among the three people.


100
100
10
10
10
10
100
100
10
10
10
10
100
100
10
10
10
10

= ___

) ____________________

# SHARPENING YOUR SKILLS

**Units 42, 43, 44**

**Name:** ____________________ **Class:** ____________ **Date:** ________________

1. I am a quadrilateral. My opposite sides are equal and parallel. None of my angles is a right angle.

   What am I?

   ⓐ a rectangle

   ⓑ a square

   ⓒ a parallelogram

   ⓓ Not Here

2. Name two more parallelograms in your classroom.

   window pane____________

   ______________________

   ______________________

3. Write the correct words in the blanks to complete the paragraph.

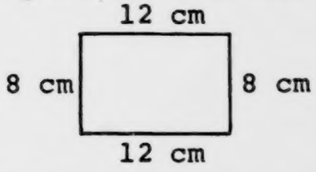
   A quadrilateral is any plane closed figure with four straight sides and ____________ angles. A quadrilateral in which both pairs of opposite sides are ________________ is a parallelogram. A parallelogram with four right angles and sides which are equal is a __________.

4. When you add the total distance around the sides of an object or space, you are measuring its ____________.

   ⓔ area ⓖ radius

   ⓕ diameter ⓗ perimeter

5. Find the perimeter of the rectangle.



   Perimeter = ____________

6. Which of the following demonstrates the distributive property of division over addition?

   ⓐ

| | |
|---|---|
| 8 x 3 = 24 | 24 ÷ 3 = 8 |
| 3 x 8 = 24 | 24 ÷ 8 = 3 |

   ⓑ 7 x 2 = 2 x 7

   ⓒ $48 \div 5 = \frac{48}{5} = \frac{45+3}{5} = \frac{45}{5}+\frac{3}{5} = 9+\frac{3}{5} = 9\frac{3}{5}$

   ⓓ Not Here

7. Divide.

   $4\overline{)\,4 \text{ tens} + 8 \text{ ones}}$ = ______

   $2\overline{)\,8 \text{ hundreds} + 4 \text{ tens} + 2 \text{ ones}}$ = ______

Unit 45

## 4.04.03 MULTIPLICATION OF MONEY VALUES

(2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.04.03.01A round values to the nearest dollar to estimate products;

e.g.,

$$\begin{array}{rcrl} \$2.13 & \text{rounds to} & \$2.00 & \\ \underline{\times\quad 3} & & \underline{\times\quad 3} & \\ & & \$6.00 & \text{estimated product} \end{array}$$

4.04.03.02A multiply values to \$.99 by a 1-digit multiplier;

e.g.,

$$\begin{array}{r} \$.\overset{1}{7}5 \\ \underline{\times\quad 3} \\ \$2.25 \end{array}$$

4.04.03.03A multiply values to \$9.99 by a 1-digit multiplier;

e.g.,

$$\begin{array}{r} \$\overset{1}{8}.\overset{1}{6}7 \\ \underline{\times\quad 2} \\ \$17.34 \end{array}$$

4.04.03.04A solve word problems related to skills learned in this module.

e.g.,

Sarah bought 4 loaves of bread for \$.89 each. How much did she pay for the bread?

## VOCABULARY

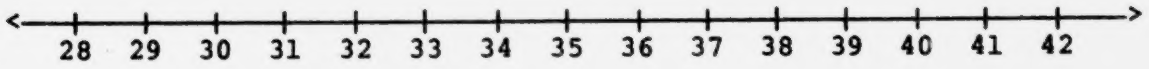
### TERMS

round
estimate
product

## GETTING STARTED 1:

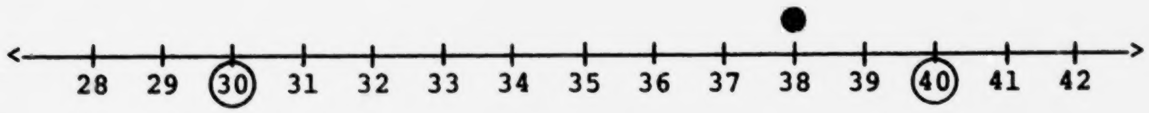
Prepare and display a number line and a disc to be used as a marker.

e.g.,


28
29
30
31
32
33
34
35
36
37
38
39
40
41
42

Ask a student to place the disc above the number 38. Say, "Between which two tens is 38 located?" (38 is between 30 and 40.) Ask another student to circle 30 and 40 on the number line.

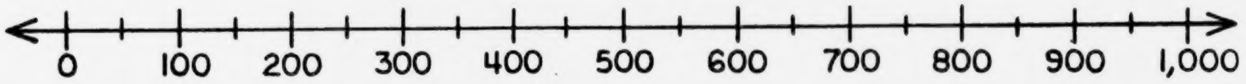
e.g.,


28
29
30
31
32
33
34
35
36
37
38
39
40
41
42

Say, "To which ten shall we round 38?" (We shall round 38 to 40.) Why?" (38 is closer to 40 than to 30.) Demonstrate how 38 is closer, in distance, to 40 than to 30. Say, "How else can we explain why 38 rounds to 40?" (To round to the nearest ten, we look at the digit in the ones place. If that digit is less than 5, we round to the lesser ten. If that digit is 5 or more, we round to the greater ten. 38 rounds to 40 because the 8 in the ones place is greater than 5.)

Repeat this procedure to round other 2-digit numbers to the nearest ten. Use a number line which counts by hundreds to round 3-digit numbers to the nearest hundred.

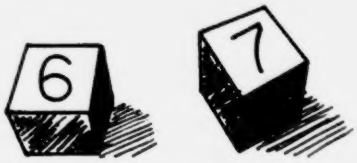
e.g.,


0
100
200
300
400
500
600
700
800
900
1,000

## GETTING STARTED 2:

Prepare a paper bag and 4 small cubes to be used as dice. The faces on two of the cubes should each have a numeral from 1 through 6. The faces of the remaining two cubes should each have a numeral from 7 through 12. Divide the students into two groups. Display the cubes and say, "I will place these cubes in the bag. A member from one team will choose a pair of dice from the bag without looking, roll the dice, and multiply the numerals on the top of each die."

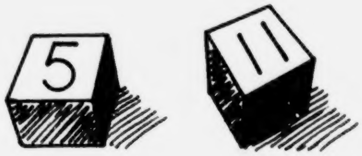
e.g.,



6 x 7 = 42

Say, "If you multiply correctly, your team will score one point. If you multiply incorrectly, your team will lose one point. After your turn, a member from the other team will take his/her turn to roll the dice and multiply."

e.g.,



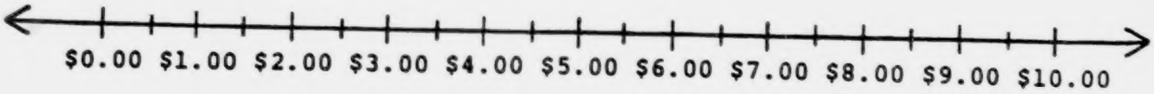
5 x 11 = 55

Play the game until one team scores 25 points or until sufficient practice has been given.

**4.04.03**

**4.04.03.01** **round values to the nearest dollar to estimate products**

**STRATEGY 1:** Prepare and display a number line with marks to represent dollars and half-dollars.
e.g.,



Ask the students to read the amounts aloud. Say, "What amount is the midpoint between 0 dollars and 1 dollar? (The midpoint beween 0 dollars and 1 dollar is 50 cents.) How do you know?" (50 cents is half of 1 dollar.) Mark $.50 on the number line. Repeat this procedure by naming and labeling each of the other midpoints on the number line.

Write a multiplication example involving money on the chalkboard.
e.g.,

$$\begin{array}{r} \$3.82 \\ \underline{\times \quad 3} \end{array}$$

Say, "We will estimate the product of this example. How can we do that? (We can round $3.82 to the nearest dollar and multiply the rounded amount by 3.) Say, "Look at the number line. Between which whole dollar amounts will we find $3.82? ($3.82 is between $3.00 and $4.00.) It is closer to $3.00 or $4.00? ($3.82 is closer to $4.00.) How do you know?" ($3.82 is greater than the midpoint between $3.00 and $4.00. Therefore, it is closer to $4.00.) Write the following on the chalkboard:

estimate

$$\begin{array}{r} \$4.00 \\ \underline{\times \quad 3} \end{array} \qquad\qquad \begin{array}{r} \$3.82 \\ \underline{\times \quad 3} \end{array}$$

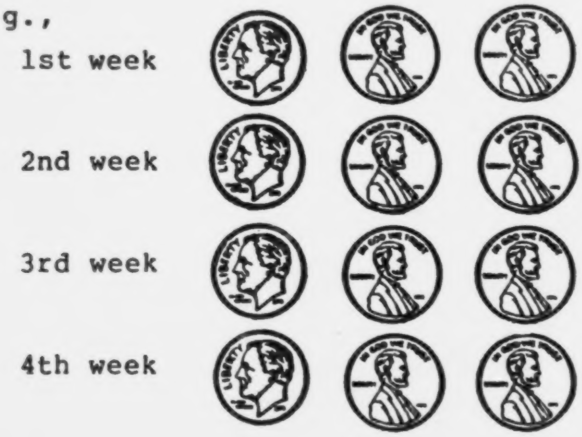
**STRATEGY 1:** cont'd

Say, "How much is 4 dollars times 3?" (4 dollars times 3 equals 12 dollars.) Ask a student to write $12.00 as the estimated product. Repeat this procedure to estimate other products. Say, "How does estimating money amounts help us?" (Estimating money amounts helps us know whether we have enough money to make our purchase.)

**4.04.03.02** **multiply values to $.99 by a 1-digit multiplier**

**STRATEGY 1:** Prepare and display demonstration-size play money (dimes and pennies). Display a dime and two pennies. Say, "This is the amount of money a student saves each week. How can we find out how much she saves in four weeks?" (One way we can show how much she saves is by displaying the coins.) Display the money saved.

e.g.,



Say, "How does showing the coins help us? (We can count the money to see how much she saved.) How much did she save? (She saved 4 dimes and 8 pennies. Therefore, she saved 48¢.) How else could you find the answer? (We could add 12¢ four times.) When we are adding the same amount many times, what shortcut can we use?" (We can multiply.) Write the example on the chalkboard.

e.g.,

$.12
x 4

**STRATEGY 1:** cont'd

Say, "Multiplying with money is just like multiplying whole numbers except that we must remember to use a decimal point and dollar sign in the product." Ask a student to multiply 4 times $.12 at the chalkboard as the other students multiply it in their notebooks. Say, "How much is 4 times 12 cents? (4 times 12 cents equals 48 cents.) Place a decimal point and a dollar sign in the product to show that we are talking about 48 cents."

e.g.,

```
 $.12
x   4
-----
 $.48
```

Say, "How does multiplying with money amounts compare to multiplying whole numbers? (When we multiply with money, we must remember to show the dollar sign and the decimal point in the factor and the product, but the way we multiply is the same.) Repeat this procedure with other multiplication examples involving money amounts through $.99.

**STRATEGY 2:** On the chalkboard write a multiplication example involving a monetary amount through $.99.

e.g.,

```
 $.36
x   3
-----
```

Ask a student to read the example aloud. Say, "Who can think of a problem that this example would represent?" (Accept reasonable responses.)

e.g.,

- If one pen costs $.36, how much will 3 pens costs?

- Toni saved $.36 a week for 3 weeks. How much did she save in all?

Say, "When we multiply amounts of money, we use the same method as when we multiply whole numbers. However, instead of thinking of tens and ones we

**STRATEGY 2:**
cont'd

can think of dimes and pennies. Look at the example on the chalkboard. In the amount $.36, how many dimes and pennies are there? (There are 3 dimes and 6 pennies.) We will begin by multiplying the ones, or pennies. How much is 3 times 6 pennies? (3 times 6 pennies equals 18 pennies.) Since we can't write 2 digits in a single place in the product, what do you think we should do? (We can exchange 10 of the 18 pennies for 1 dime.) How many pennies will we have to write in the product? (We will have 8 pennies to write in the product.) How shall we remember that we have an extra dime from the exchange we made?" (We shall write a 1 above the 3 in the dimes, or tens, column.) Ask a student to show this at the chalkboard.

e.g.

$$\begin{array}{r} \$.\overset{1}{3}6 \\ \times\quad 3 \\ \hline 8 \end{array}$$

Say, "When we multiply the dimes, how much is 3 times 3 dimes? (3 times 3 dimes equals 9 dimes.) What will we do with the extra dime we had from the exchange? (We will add it to the 9 dimes we have. Then we will have 10 dimes.) Since we can't write a 2-digit number in a single place in the product, what shall we do? (We can exchange 10 dimes for 1 dollar.) How many dimes will we have to write in the product? (We will have 0 dimes to write in the product.) Where will we write the 1 dollar we got from the exchange?" (We will write it in the dollars, or hundreds place, in the product since we are finished multiplying.) Ask a student to show this in the example on the chalkboard.

e.g.,

$$\begin{array}{r} \$.\overset{1}{3}6 \\ \times\quad 3 \\ \hline 1\ 08 \end{array}$$

**STRATEGY 2: cont'd** Say, "Since we are multiplying money, the product must be written as money. How many digits are to the right of the decimal point in money? (There will be two places to the right of the decimal point.) What will we write to the left of the product to indicate money?" (We will write a dollar sign.) Ask a student to place a dollar sign and decimal point in the product and to read the product aloud.

e.g.,

$$\begin{array}{r} {\scriptstyle 1\;\;} \\ \$.36 \\ \underline{\times \quad 3} \\ \$1.08 \end{array}$$

Ask the students to write this example in their notebooks. Repeat this procedure with other similar examples.

**4.04.03.03** **multiply values to $9.99 by a 1-digit multiplier**

**STRATEGY 1:** Adapt Strategy 1 or Strategy 2, P.O. 4.04.03.02. Using skills learned in P.O. 4.04.03.01, ask the students to estimate the product before finding the actual product.

**4.04.03.04** **solve word problems related to skills learned in this module**

**STRATEGY 1:** Write a word problem on the chalkboard.

e.g.,

> Karen bought 6 cans of juice at $.98 each. How much did she pay for the juice in all?

Ask a student to read the problem aloud. Say, "What information does the problem tell us? (Karen bought 6 cans of juice and each can costs $.98.) What are we asked to find? (We must find out how much Karen spent in all for the 6 cans of juice.) How can we solve this problem? (We can add $.98 six times.) Is

**STRATEGY 1: cont'd** there a shorter way to solve this problem? (Yes, we can multiply 6 times $.98.) Before we multiply, we will estimate the product. How can we do that? (We can round the money amount to the nearest dollar and multiply the rounded amount by 6.) What is $.98 rounded to the nearest dollar? ($.98 rounded to the nearest dollar is 1 dollar.) How much is 6 times 1 dollar?" (6 times 1 dollar is 6 dollars.) On the chalkboard write: estimate = $6.00. Ask a student to solve the example to find the actual answer at the chalkboard as the other students work in their notebooks.

e.g.,

Estimate = $6.00

$$\begin{array}{r} \$\ .\overset{4}{9}8 \\ \underline{\times\qquad 6} \\ \$5.88 \end{array}$$

Say, "What is the product? (The product is $5.88.) How do you know this product is reasonable? (It is close to our estimate of $6.00. Therefore, it is reasonable.) What is the answer to the problem?" (Karen spent $5.88 to buy the 6 cans of juice.)

Repeat this procedure with other word problems.

**STRATEGY 2:** Prepare and display the following chart:

| Plant Sale | |
|---|---|
| Begonias | $3.95 |
| Petunias | $3.95 |
| Geraniums | $5.59 |
| Tiger Lilies | $ .88 |

Say, "Patti bought 4 begonias at the plant sale. How can we find out how much Patti spent? (We can multiply the cost for 1 begonia $3.95, times 4.) Why should we multiply? (When we know the cost of one

**STRATEGY 2:**
cont'd

item and we want to know the cost of several of these items, we multiply.) About how much do you think Patti spent? (Patti spent about 16 dollars.) How do you know?" (If we round the cost of one begonia, $3.95, to the nearest dollar, we get 4 dollars. 4 times 4 dollars is 16 dollars.) On the chalkboard write: estimate = $16.00. Ask the students to find the actual cost by solving the problem in their notebooks.

e.g.,

Estimate = $6.00

$$\begin{array}{r} \$3.95 \\ \underline{\times \quad 4} \\ \$15.80 \end{array}$$

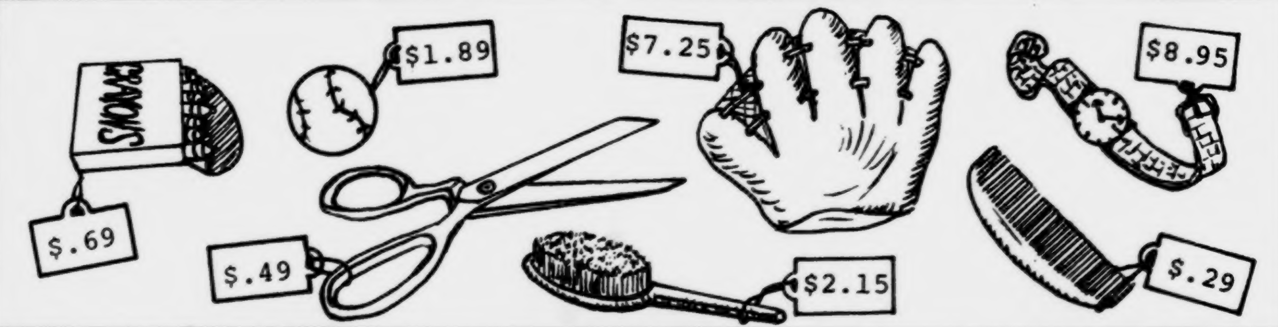
Say, "How much did Patti spend for 4 begonias? (Patti spent $15.80.) How do you know this answer is reasonable?" (It is close to our estimate of $16.00.)

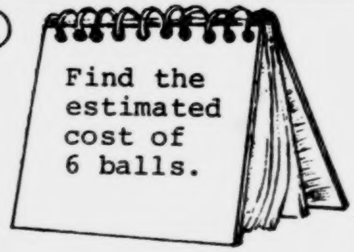
Repeat this procedure using other problems related to the chart. The students should be encouraged to create their own word problems.

P.O. 4.04.03.01-.02

**NAME:**______________________ **CLASS:**________ **DATE:**_______

Look at the cost of each item. Follow the directions on each pad.



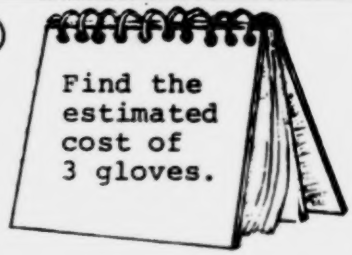
① 
Find the estimated cost of 6 balls.

$1.89 *rounds to* $2.00
x 6
$12.00

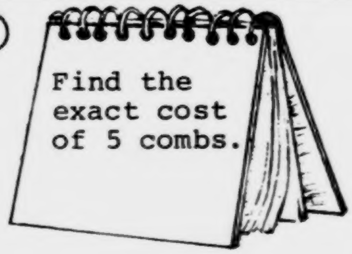
Estimated Cost

②
Find the estimated cost of 2 watches.

Estimated Cost

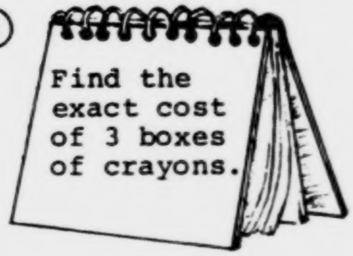
③ 
Find the estimated cost of 3 gloves.

Estimated Cost

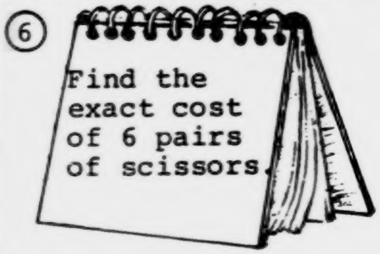
④ 
Find the exact cost of 5 combs.

$.29
x 5

Exact Cost

⑤ 
Find the exact cost of 3 boxes of crayons.

Exact Cost

⑥ 
Find the exact cost of 6 pairs of scissors.

Exact Cost

## Do you remember?

Change each improper fraction to a mixed number.

$\frac{5}{4} = \square$ $\frac{6}{5} = \square$ $\frac{8}{3} = \square$ $\frac{9}{4} = \square$

P.O. 4.04.03.01 & .03

NAME:______________________________ CLASS:__________ DATE:________

Estimate each product. Then find the exact product.

| | | | | | |
|---|---|---|---|---|---|
| $6.20<br>x 3 | rounds to | $6.00<br>x 3<br>$18.00 | estimated product | $6.20<br>x 3<br>18.60 | actual product |
| $7.99<br>x 5 | rounds to | ☐<br>x 5 | estimated product | $7.99<br>x 5 | actual product |
| $9.12<br>x 4 | rounds to | ☐<br>x 4 | estimated product | $9.12<br>x 4 | actual product |
| $8.05<br>x 7 | rounds to | ☐<br>x 7 | estimated product | $8.05<br>x 7 | actual product |
| $5.95<br>x 6 | rounds to | ☐<br>x 6 | estimated product | $5.95<br>x 6 | actual product |
| $2.81<br>x 9 | rounds to | ☐<br>x 9 | estimated product | $2.81<br>x 9 | actual product |

P.O. 4.04.03.04

NAME:______________________ CLASS:__________ DATE:________

Estimate the answer to each problem and then find the exact answer.

1. Ricky's scout troop saved $7.95 weekly for their annual holiday picnic.

   a. How much did they save after 4 weeks?

   estimate solve

   They saved ______________.

   b. How much did they save after 8 weeks?

   estimate solve

   They saved ______________.

   c. How much did they save after 9 weeks?

   estimate solve

   They saved ______________.

2. Ricky and his friends went to the bakery to buy cakes for the picnic. They saw this price list for cakes.

| PRICE LIST FOR CAKES | |
|---|---|
| COCONUT CAKE ........ | $2.10 |
| CHOCOLATE CAKE....... | $3.50 |
| RAISIN CAKE.......... | $1.95 |

   a. How much did they spend for 3 coconut cakes?

   estimate solve

   ______________

   b. How much did they spend for 7 raisin cakes?

   estimate solve

   ______________

**CHALLENGE!** Find the missing digits.

$$\begin{array}{r} \$254.32 \\ -\quad 48.\square 4 \\ \hline \$\square 0\square.88 \end{array} \qquad \begin{array}{r} 16,2\square\square \\ -\quad 525 \\ \hline \square\square,766 \end{array} \qquad \begin{array}{r} 49,8\square 3 \\ -22,97\square \\ \hline \square\square,831 \end{array}$$

## 4.05.05 DIVISION OF MONEY VALUES

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.05.05.01A round to the nearest dollar to estimate quotients;

e.g.,

$3\overline{)\$5.85}$ rounds to $\begin{array}{r}\$2.00\\ 3\overline{)\$6.00}\end{array}$ estimated quotient

4.05.05.02A divide values to $.99 by a 1-digit divisor and check;

e.g.,

$$\begin{array}{r}\$.12\\ 6\overline{)\$.72}\end{array}$$

check

$$\begin{array}{r}{\scriptstyle 1}\\ \$.12\\ \underline{\times\ 6}\\ \$.72\end{array}$$

4.05.05.03A divide values to $9.99 by a 1-digit divisor and check.

e.g.,

$$\begin{array}{r}\$3.33\\ 3\overline{)\$9.99}\end{array}$$

check

$$\begin{array}{r}\$3.33\\ \underline{\times\quad 3}\\ \$9.99\end{array}$$

4.05.05.04A solve word problems related to skills learned in this module.

e.g.,

> Three boxes of stationery sell for $9.99. How much does one box cost?

4.05.05

## VOCABULARY

### TERMS

divisor
dividend
quotient
decimal point
dollar sign
estimate

---

### GETTING STARTED 1:

Prepare and display a set of flashcards with division of 2- and 3-digit numbers by 1-digit divisors without exchange or remainders.
e.g.,

$2\overline{)46}$ $3\overline{)363}$

Divide the students into two teams. Say, "Today we will play Division Baseball. I will display a card with a division example written on it. A member of Team A will read the example aloud and solve it at the chalkboard. If his/her answer is correct, that team member will go to first base. If the answer is incorrect, that team has an out. After 3 outs, the other team takes their turn. Each time a correct answer is given the players move ahead one base. Each time a player reaches home, that team scores a point." Play the game for a specific number of innings.

### GETTING STARTED 2:

Prepare and display a set of flashcards, each with a problem involving rounding numbers to the nearest ten or hundred.
e.g.,

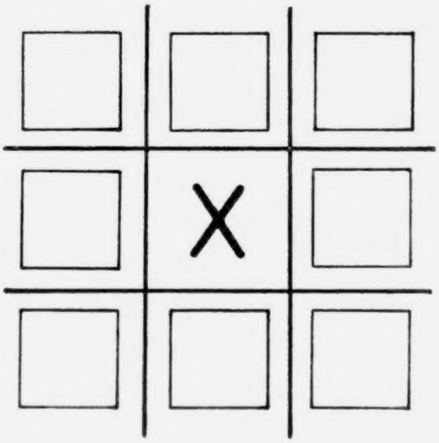
There are 21 forks in a package.
About how many forks are there in
2 packages?

Draw a tic-tac-toe board on the chalkboard. Place a flashcard in each square of the tic-tac-toe board. Divide the students into 2 teams.

**GETTING STARTED 2:** cont'd

Say, "Today we will play Tic-Tac-Toe Round-Up. One team will be called X and the other team will be called O. A team member will choose a flashcard from one of the squares of the tic-tac-toe, read the problem, and estimate the answer. If he/she makes a good estimate, he/she may place an X or an O in the square from which the problem was chosen.

e.g.,



If he/she answers incorrectly then the other team has a chance to choose the same problem or a different one. The first team to get tic-tac-toe is the winner." Play the game until sufficient practice has been given.

**4.05.05.01** **round to the nearest dollar to estimate quotients**

**STRATEGY 1:** Write several money amounts on the chalkboard.

e.g.,

$3.25 $4.76 $2.87 $5.29

Ask the students to read each amount aloud. Say, "What does the digit to the left of the decimal point represent? (The digit to the left of the decimal point represents dollars.) What do the digits to the right of the decimal point represent? (The digits to the right of the decimal point represent cents.) We will round these amounts on the chalkboard to the nearest dollar. When we round money values to the nearest dollar we can look at the amount to the right of the decimal point to help us decide how to round that number. Look at the first amount on the chalkboard. Between which dollar values is $3.25? ($3.25 is between $3.00 and $4.00.) What money amount is half way between $3.00 and $4.00? ($3.50 is half way between $3.00 and $4.00.) To round an amount to the nearest dollar we must first decide between which dollar values it comes. Then, we look at the amount to the right of the decimal point. If that amount is less than the half way mark, $.50, then we round down to the lesser dollar amount. If it is $.50 or more, we round up to the next higher dollar amount. Will we round $3.25 to $3.00 or $4.00? (We will round $3.25 to $3.00.) Why?" ($.25 is less than $.50 so we round to the lesser dollar amount.)

Repeat this procedure with the other amounts on the chalkboard. Say, "When we divide money we can estimate the answer by first rounding the amount of money to the nearest dollar." Write a division example on the chalkboard.

e.g.,

$2\overline{)\$5.89}$

**4.05.05**

**STRATEGY 1:** cont'd

Ask a student to read the example. Say, "What problem might this example represent?" (Accept reasonable responses.) We can estimate the quotient by rounding the $5.89 to the nearest dollar. What is $5.89 rounded to the nearest dollar?" ($5.89 rounded to the nearest dollar is $6.00) Write the rounded example on the chalkboard.

e.g.,

$2\overline{)\$5.89}$ rounded to the nearest dollar is $2\overline{)\$6.00}$

Say, "How much is 6 divided by 2? (6 divided by 2 is 3.) How much is 6 dollars divided by 2?" (6 dollars divided by 2 is 3 dollars.) Complete the estimate on the chalkboard.

e.g.,

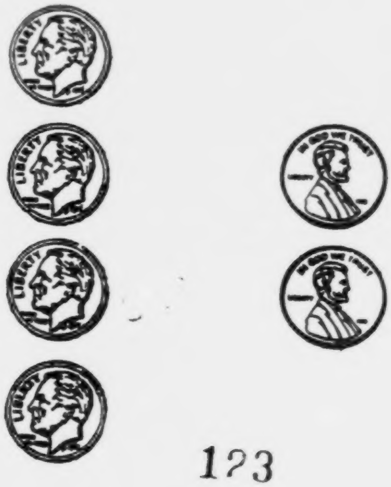
$\$2\overline{)\$5.89}$ rounded to the nearest dollar is $\begin{array}{r}\$3.00\\ 2\overline{)\$6.00}\end{array}$

Say, "What is the estimated quotient?" (The estimated quotient is $3.00.) Repeat this procedure using other examples.

**4.05.05.02** **divide values to $.99 by a 1-digit divisor and check**

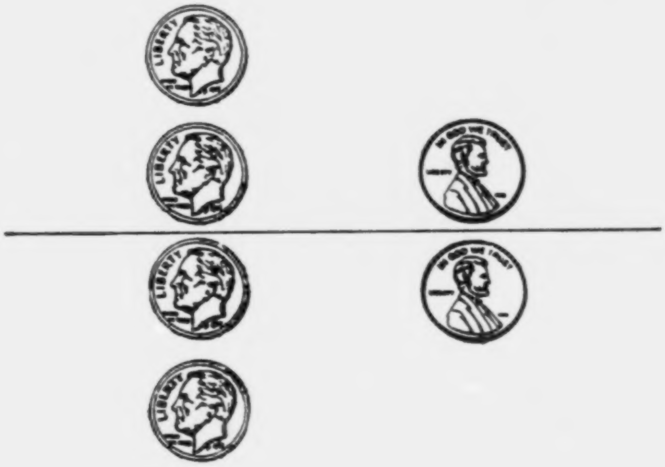
**STRATEGY 1:** Prepare and display a demonstration set of play money in various denominations of coins backed with tape. On the chalkboard write: $.42. Ask a student to come up to the chalkboard and show $.42 using the play money.

e.g.,



**STRATEGY 1:** cont'd

Ask another student to come to the chalkboard and divide the play money into 2 groups of equal value. e.g.,



Say, " How many dimes are in each group? (There are 2 dimes in each group.) What is the value of 2 dimes? (The value of 2 dimes is 20¢.) How many pennies are in each group? (There is 1 penny in each group.) What is the value of 1 penny? (The value of 1 penny is 1¢). How much money is in each group?" There is 21¢ in each group.) Write the following example on the chalkboard: 2)$.42

Ask a student to read the example. Say, "Another way to find out how much money is in each group is by dividing $.42 by two. When we divide money we always use a dollar sign and decimal point in the dividend and in the quotient. Then we can divide just as we do when there is no dollar sign or decimal point." Ask a student to complete the division at the chalkboard while the other students work in their notebooks.

e.g,

```
  $.21
2)$.42
```

**STRATEGY 1: cont'd**

Say, "How can we check our answer?" (We can check our answer by multiplying the quotient by the divisor. The result should be the dividend.) Ask a student to check the example at the chalkboard as the other students check it in their notebooks.

e.g.,

$$\begin{array}{r} \$.21 \\ 2\overline{)\$.42} \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ \$.21 \\ \underline{\times \quad 2} \\ \$.42 \end{array}$$

Repeat this procedure with other division examples.

**STRATEGY 2:**

Write the following examples on the chalkboard:

$$3\overline{)42} \qquad 3\overline{)\$.42}$$

Ask a student to read the first example. Say, "What is the divisor? (The divisor is 3.) What is the dividend? (The dividend is 42.) What must we find?" (We must find the quotient.) Then ask the students to look at the second example. Say, "What is the difference between the two examples? (The second example has a dollar sign and decimal point.) What do the dollar sign and the decimal point tell us? (The dollar sign and the decimal point tell us we are dealing with money.) Since the divisors and dividends in both examples are the same, what does this tell us about the quotient in each example?" (This tells us that both examples will have the same quotient, but the second example will have a dollar sign and a decimal point in the quotient.) Ask two students to come to the chalkboard and solve each example while the other students solve them in their notebooks. Remind the students to place a dollar sign and a decimal point in the quotient in the second example.

e.g.,

$$\begin{array}{r} 14 \\ 3\overline{)42} \end{array} \qquad \begin{array}{r} \$.14 \\ 3\overline{)\$.42} \end{array}$$

4.05.05

**STRATEGY 2:** cont'd

Say, "How can we check our answers?" (We can check by multiplying the quotients and the divisors. The results should be the same as the dividends.)

e.g.,

$$\begin{array}{r} \underline{\text{check}} \\ 14 \\ \underline{\times 3} \\ 42 \end{array} \qquad\qquad \begin{array}{r} \underline{\text{check}} \\ \$.14 \\ \underline{\times \quad 3} \\ \$.42 \end{array}$$

Repeat this procedure using other pairs of examples.

4.05.05.03 **divide values to $9.99 by a 1-digit divisor and check**

**STRATEGY 1:** Adapt Strategy 1 or Strategy 2, P.O. 4.05.05.02, for use with values through $9.99. Students should incorporate the estimation skills learned in P.O.4.05.05.01.

4.05.05.04 **solve word problems related to skills learned in this module**

**STRATEGY 1:** Prepare and display a story problem.

e.g.,

> Ted bought two pounds of meat for $5.88. How much did 1 pound of meat cost?

Ask a student to read the story problem aloud. Say, "What information do we have in this word problem? (We know that two pounds of meat cost $5.88.) What do we want to find out? (We want to find out how much one pound of meat costs.) How can we solve this problem? (We can divide $5.88 by 2.) First we will estimate the cost of 1 pound of meat. How can we do that. (We can round $5.88 to the nearest dollar and divide the rounded amount by 2.) How much is $5.88 rounded to the nearest dollar?" ($5.88 rounded to the nearest dollar is $6.00.) On the chalkboard, write:

$$2\overline{)\$5.88} \text{ rounds to } 2\overline{)\$6.00}$$

**STRATEGY 1:** cont'd

Say, "How much is 6 dollars divided by 2?" (6 dollars divided by 2 is 3 dollars.) Complete the estimate on the chalkboard.

e.g.,

$$2\overline{)\$5.88} \quad \text{rounds to} \quad \begin{array}{r}\$3.00\\ 2\overline{)\$6.00}\end{array} \text{ estimated quotient}$$

Say, "We know that one pound of meat costs about $3.00. Now we will solve to find the actual cost." Ask a student to solve the problem at the chalkboard and check it as the other students work in their notebooks. Say, "What is the answer to the problem?" (One pound of meat costs $2.94.)

Repeat this procedure with other word problems.

P.O. 4.05.05.01 & .04

**NAME:** ______________________________ **CLASS:** ________ **DATE:** ________

Follow the directions below.

## A. Round each amount to the nearest dollar.

$8.93 rounded to the nearest dollar is __________.

$5.49 rounded to the nearest dollar is __________.

$1.62 rounded to the nearest dollar is __________.

$9.19 rounded to the nearest dollar is __________.

$6.76 rounded to the nearest dollar is __________.

$8.50 rounded to the nearest dollar is __________.

$4.02 rounded to the nearest dollar is __________.

$ .98 rounded to the nearest dollar is __________.

## B. Estimate each quotient.

① 3)$6.18

estimate

$$\begin{array}{r} \$2.00 \\ 3\overline{)\$6.00} \end{array}$$

② 4)$9.28

estimate

③ 5)$8.85

estimate

④ 2)$7.50

estimate

## C. Solve.

Tony puts the same amount of money into his bank each week. After 3 weeks Tony had $8.79. About how much did Tony put in his bank each week?

______________________

P.O. 4.05.05.02 & .04

**NAME:**____________________________ **CLASS:**________ **DATE:**_______

Solve and check.

① **check**

$$\begin{array}{r} \$.15 \\ 5\overline{)\$.75} \end{array} \qquad \begin{array}{r} \$.\overset{2}{1}5 \\ \times\ \ 5 \\ \hline \$.75 \end{array}$$

② **check**

$$2\overline{)\$.30}$$

③ **check**

$$7\overline{)\$.49}$$

④ **check**

$$3\overline{)\$.69}$$

⑤ **check**

$$4\overline{)\$.84}$$

⑥ **check**

$$6\overline{)\$.96}$$

⑦ If 3 pens cost $.78, how much will one pen cost?

________________

**solve** **check**

⑧ Mr. Carson gave his two sons $.98 to share. How much did each boy get?

________________

**solve** **check**

P.O. 4.05.05.03-.04

**NAME:**________________________________________**CLASS:**__________**DATE:**_______

Estimate, solve, and check.

① Estimate = $5.00

solve

$$\begin{array}{r} \$4.87 \\ 2\overline{)\$9.74} \end{array}$$

check

$$\begin{array}{r} \$4.87 \\ \times\quad 2 \\ \hline \$9.74 \end{array}$$

② Estimate = __________

solve check

$$5\overline{)\$6.75}$$

③ Estimate = __________

solve check

$$7\overline{)\$8.47}$$

④ Estimate = __________

solve check

$$3\overline{)\$9.84}$$

⑤ Ms. Bennet bought 5 pounds of sugar for $2.95. How much did one pound of sugar cost?

estimate solve check

One pound of sugar cost __________.

⑥ Brad had $6.27 to share among his 3 younger brothers. How much did Brad give to each of his younger brothers?

estimate solve check

He gave each brother __________.

Unit 47

## 4.01.06 ROMAN SYSTEM TO SYMBOL C

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.01.06.01A identify the Roman symbols I, V, and X and use them to write Roman numerals from I through XXXIX (1 through 39);

e.g.,

I = 1
V = 5
X = 10

4.01.06.02A identify the Roman symbols L and C and use them, with I, V, and X, to write Roman numerals from XL through C (40 through 100);

e.g.,

L = 50 LX = 60
C = 100 XC = 90

4.01.06.03B rename a Roman numeral as its Arabic equivalent;

e.g.,

XLIII = 43
LXV = 65
XCI = 91

4.01.06.04C identify and write Roman numerals from CI through CCCXCIX (101 through 399).

153 = CLIII
291 = CCXCI

## VOCABULARY

### TERMS

Roman numerals
Arabic numerals

---

### GETTING STARTED 1:

Prepare and display numeral cards for the numbers 0 through 10. Shuffle the cards and place them face down on a desk. Say, "There are many ways to name a number. We will see how many different ways we can name the numbers that appear on these cards." Ask a student to select a card and display it on the chalk ledge, e.g., $\boxed{7}$. Say, "What is another name for 7?" (Accept all reasonable reponses, e.g., 4 + 3, 8 - 1, 42 ÷ 6, ...) As each response is given, ask a student to write each name for 7 on the chalkboard above the card. e.g.,

$$\begin{array}{c} 42 \div 6 \\ 8 - 1 \\ 4 + 3 \\ \boxed{7} \end{array}$$

Repeat this procedure with the remaining cards.

---

### GETTING STARTED 2:

Prepare a set of numeral cards for the numbers 1 through 9 and a set of cards for the numbers 10 through 90 (counting by tens). Place the cards on the chalk ledge with the blank side facing the students.

Separate the students into two or three teams and say, "A student from the first team will select three cards and find the sum mentally." e.g.,

$$\boxed{30} + \boxed{10} + \boxed{4} = 44$$

Say, "If you are correct, your team will score one point. Your team will not score any points for a wrong answer. Each team will have a turn and then we will start all over again." Repeat this procedure until one team scores 15 points.

**4.01.06**

**4.01.06.01** **identify the Roman symbols I, V, and X and use them to write Roman numerals from I through XXXIX (1 through 39)**

**STRATEGY 1:** Say, "We have seen how a number can have many names. Today we will find another way to represent a number. We will use Roman numerals." Write the following on the chalkboard:

| Roman numeral | Arabic numeral |
|---|---|
| I | |
| V | |
| X | |

Say, "The symbols I, V, and X are Roman numerals. We will learn their values in Arabic numerals, that is, the numbers we are familiar with." Next to each Roman numeral write its equivalent Arabic numeral.
e.g.,

| Roman numeral | | Arabic numeral |
|---|---|---|
| I | = | 1 |
| V | = | 5 |
| X | = | 10 |

Ask the students to read each Roman numeral and its equivalent value. Say, "Using these three symbols, the Romans could write every number from 1 through 39. How many digits do we need in Arabic numerals to be able to write every number from 1 through 39? (We would need 10 symbols, the digits 0 through 9.) In the Roman system, however, more symbols were needed to write numbers beyond 39. In the Arabic system, 10 digits are all we ever need, no matter how big a number we want to write."

On the chalkboard write the Arabic numerals 1 through 10. Say, "In our number system, we use place value to show the value of a number. The Roman system does not use place value. Instead, the Romans added

**STRATEGY 1:** cont'd

across from left to right. Point to the numeral 1 and say, "How do we write this amount in Roman numerals?" (We use the letter I.) Ask a student to write I below the numeral 1 on the chalkboard as the other students write it in their notebooks.

Say, "Remember, we think about adding values when we write Roman numerals. To represent 2, we think about adding 1 + 1, and we write two I's." Below the numeral 2 on the chalkboard, write II. Say, "How do you think we will represent 3?" (We will think 1 + 1 + 1 = 3 and write 3 I's.) Ask a student to write the Roman numeral below the 3 on the chalkboard.

e.g.,

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| I | II | III | | | | | | | |

Say, "The Romans did not use any symbol more than three times in a row. Therefore, we cannot write 4 using 1 + 1 + 1 + 1. Instead, we will think of another name for 4. Below 4 on the chalkboard, write IV. Say, "For the number 4, the Romans thought of 5 -1. To write about this, we put the Roman symbol for 1 to the left of the symbol for 5. Usually we add from left to right to find the value of a Roman numeral. However, when we see a lesser value, such as I, to the left of the greater value, such as V, we subtract."

Repeat this procedure to write other Roman numerals through XXXIX. Ask the students to write them in their notebooks.

Say, "Why do you suppose there is no 0 in Roman numerals?" (Since Roman numerals do not use a place value system, there is no need for 0 as a place holder.)

**4.01.06**

**4.01.06.02** **identify the Roman symbols L and C and use them, with I, V, and X, to write Roman numerals from XL to C (40 through 100.)**

**STRATEGY 1:** Adapt Strategy 1, P.O. 4.01.06.02.

**4.01.06.03** **rename a Roman numeral as its Arabic equivalent**

**STRATEGY 1:** Prepare and display a set of 25 index cards, each with a Roman numeral from I through C on it.
e.g.,

XXV LXX XVII

Select a card and tape it to the chalkboard, e.g. XXV. Say, "We have learned to write Arabic numerals as Roman numerals. Today we will write Roman numerals as Arabic numerals. Look at the card on the chalkboard. How can we decode the Roman symbols? (We can start at the left and add across.) Will that work for every Roman numeral? (No, sometimes we will subtract if we see a smaller value to the left of a greater value.) Does that happen in this Roman numeral? (No, we will only add to find the value of this Roman numeral.) What is the value of X? (X equals 10.) What is the value of two X's?" (Two X's equal 20.) Below the card on the chalkboard, write: 20. Say, "What is the value of V?" (V equals 5.) Next to 20 on the chalkboard, write: +5. Say, "How much is 20 plus 5?" (20 plus 5 equals 25.) Complete the equation on the chalkboard and ask the students to write it in their notebooks.
e.g.,

XXV

20 + 5 = 25

**STRATEGY 1:** cont'd

Repeat this procedure using the remaining Roman numeral cards. Once the students are familiar with the process, they should be encouraged to compute mentally.

**4.01.06.04** **identify and write Roman numerals from CI through CCCXCIX (101 through 399)**

**STRATEGY 1:** Adapt Strategy 1, P.O. 4.01.06.01 for use with larger numbers.

P.O. 4.01.06.01-.02

NAME: ______________________ CLASS: ________ DATE: ________

Follow the directions below.

A. Complete the chart.

Roman Numerals

1 = ________

2 = ________

3 = ________

4 = ________

5 = V

6 = ________

7 = VII

8 = ________

9 = ________

10 = ________

B. Write each of the following as Roman numerals.

24 = XXIV

52 = ________

17 = ________

100 = ________

30 = ________

66 = ________

97 = ________

83 = ________

45 = ________

11 = ________

C. Draw a line to connect each Arabic numeral with its equivalent Roman numeral.

| | |
|---|---|
| 33 | LVII |
| 14 | XCVI |
| 9 | XXXIII |
| 96 | XXXVIII |
| 57 | IX |
| 38 | XIV |

P.O. 4.01.06.03

NAME:______________________ CLASS:__________ DATE:________

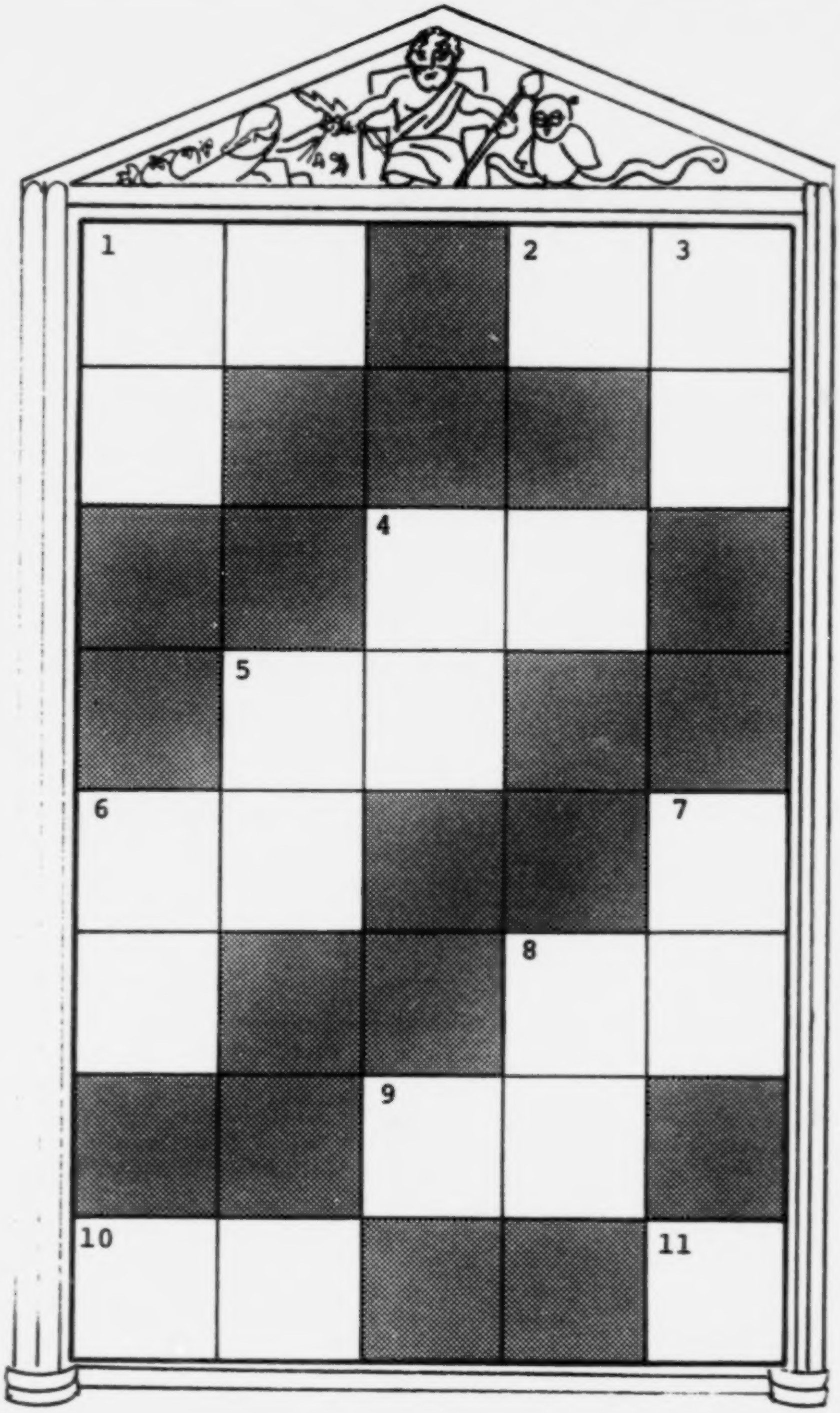
Rename Roman Numerals as Arabic Numerals.
Complete the cross number puzzle.

## ACROSS

1. XXXIV
2. LV
4. XXIX
5. LXXXV
6. L
8. LXXVII
9. XLI
10. XVIII
11. IV

## DOWN

1. XXXIX
3. LI
4. XXV
5. LXXX
6. LIX
7. XCVII
8. LXXI



| | | | | |
|---|---|---|---|---|
| 1 | | ▨ | 2 | 3 |
| | ▨ | ▨ | ▨ | |
| ▨ | ▨ | 4 | | ▨ |
| ▨ | 5 | | ▨ | ▨ |
| 6 | | ▨ | ▨ | 7 |
| | ▨ | ▨ | 8 | |
| ▨ | ▨ | 9 | | ▨ |
| 10 | | ▨ | ▨ | 11 |

P.O. 4.01.06.04

NAME:__________________ CLASS:________ DATE:________

Follow the directions below.

A.

Below each Roman number, write its value.

| I | V | X | L | C |
|---|---|---|---|---|
| ____ | ____ | ____ | ____ | ____ |

B.

Write the following as Roman numerals.

① 135 = CXXXV

② 200 = ________

③ 310 = ________

④ 140 = ________

⑤ 322 = ________

⑥ 280 = ________

⑦ 399 = ________

⑧ 265 = ________

⑨ 172 = ________

⑩ 300 = ________

⑪ 105 = ________

⑫ 219 = ________

⑬ 238 = ________

⑭ 333 = ________

## Do you remember?

Complete the chart:

____ pints = 2 quarts

____ cups = 1 quart

4 quarts = ____ gallon

6 pints = ____ quarts

12 quarts = ____ gallons

# SHARPENING YOUR SKILLS

**Units 45, 46, 47**

**Name:** ______________________ **Class:** ____________ **Date:** ____________

1. Round each amount to the nearest dollar.

$3.97 rounds to __________.

$2.54 rounds to __________.

$8.43 rounds to __________.

$5.02 rounds to __________.

2. Estimate the product.

```
 $4.16
 x   2
```

ⓐ $8.32 ⓒ $6.00

ⓑ $8.00 ⓓ Not Here

3. Find the product.

```
 $.95
  x 4
```

ⓔ $38.00 ⓖ $3.60

ⓕ $ 3.80 ⓗ Not Here

4. Multiply.

```
 $3.54
  x  4
```

5. John bought 6 pens at $.25 each. How much did he pay for the pens?

ⓐ $1.00 ⓒ $1.75

ⓑ $1.25 ⓓ Not Here

6. Estimate the quotient.

3)$8.75

ⓔ $3.00 ⓖ $2.75

ⓕ $2.00 ⓗ Not Here

7. Find the quotient.

4)$.96

8. Three Gobots are on sale for $7.56. How much will one Gobot cost?

______________

9. Draw lines to match each Roman numeral with its correct value.

| | |
|---|---|
| I | 10 |
| C | 50 |
| X | 1 |
| V | 100 |
| L | 5 |

10. CIX = ☐

ⓐ 110 ⓒ 109

ⓑ 101 ⓓ Not Here

11. Write 87 as a Roman numeral.

87 = ☐

Unit 48

## 4.10.05 CIRCUMFERENCE

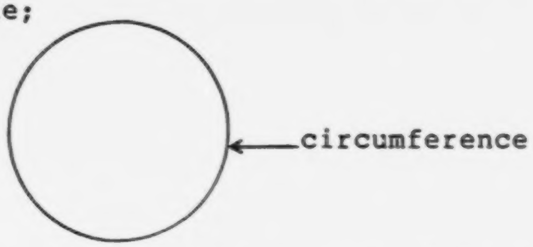
(1-2 lessons)

## PERFORMANCE OBJECTIVES

The student will be able to...

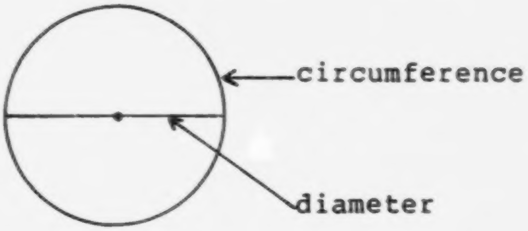
4.10.05.01B define circumference as the distance around a circle;

e.g.,


circumference

4.10.05.02B find the relationship between diameter and circumference;

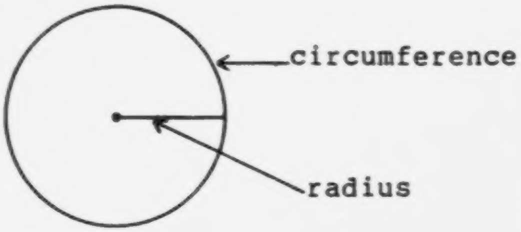
e.g.,


circumference
diameter

The circumference is approximately three times the diameter.

4.10.05.03B find the relationship between radius and circumference.

e.g.,


circumference
radius

The circumference is approximately six times the radius.

**4.10.05**

## VOCABULARY

### TERMS

circumference
diameter
radius
radii
chord

---

### GETTING STARTED 1:

Prepare and distribute a paper circle and a ruler to each student or group of students. Ask the students to fold their paper circles in half and, using a ruler, draw a line over the fold. Say, "What you have drawn is a line which cuts the circle in half. What do we call this line?" (It is called the diameter of the circle.) Ask the students to fold their circles in half in a different way and again draw over the fold line. Say, "What can we call the line we just drew? (This is another diameter of the circle.) Say, "Mark the point where the two diameters cross. This is the center of the circle. What do we call the lines that go from the center of the circle to the outside edge? (These lines are called radii.) What do we call just one of these radii? (One radii is called a radius.) What can we use to measure a radius or a diameter? (We can use a ruler.) Are all radii of the same circle the same size? (Yes.) Are all diameters of the same circle the same size? (Yes.) How can we prove this?" (We can measure each diameter and each radius.) Ask the students to measure and compare. Say, "How much longer is a diameter than a radius?" (A diameter is 2 times as long as a radius.)

---

### GETTING STARTED 2:

Draw a large rectangle on the chalkboard. Say, "What do we call the measure around the outside of a figure? (We call this measure the perimeter.) How can we find the perimeter of this rectangle? (We can measure each side and add all the measurements.) Is there a way to find the perimeter without measuring each side?" (Yes, we can measure a long side and a short side, the length and the width. Since opposite sides are equal in a rectangle, if we know the measure of the length and the width, we know the measure of their opposite sides as well.) Ask a student to measure and label the sides of the rectangle. Ask all the students to find the perimeter of the rectangle. Repeat this procedure with other figures.

**4.10.05**

**4.10.05.01** **define circumference as the distance around a circle**

**STRATEGY 1:** Prepare and distribute a ruler, an oak tag circle, and an oaktag rectangle to each student or group of students. Say, "When we wanted to measure the distance around a rectangle, what did we use? (We used a ruler.) What do we call this measure?" (It is called the perimeter.) Ask the students to measure the perimeter of the rectangle. Say, "How did you find the perimeter of the rectangle? (We measured the sides and found the total distance around the rectangle.) Why can't you measure the distance around the circle in the same way." (A circle has no straight sides. Therefore, we can't measure the distance around the outside of the circle with a ruler.) The outside of a circle is different from the outside of a polygon, and we have a different name for the distance around the outside of a circle. It is called the circumference of the circle.

Write on the chalkboard and say, "The distance around the outside of a circle is called the circumference." Ask the students to write this definition in their notebooks.

Say, "How is the outside of a circle different from the outside of a polygon? (A circle has no straight sides to measure.) What do we call the measure of the outside of a polygon? (It is the perimeter.) What is the distance around the outside of a circle called? (It is called the circumference.) How might we measure the circumference of our oak tag circle?" (We could place a string around it and then measure the length of the string.)

4.10.05

4.10.05.02 **find the relationship between diameter and circumference**

**STRATEGY 1:** Prepare and distribute a jar lid, string, scissors, and rulers to each group of students. Say, "What do we call the distance around the outside of a circle? (The distance around the outside of a circle is called the circumference.) We will find a way to measure the circumference of a circle using a string and a ruler. Which object do you have that is a circle? (The top of the jar lid is a circle.) Hold your piece of string tightly between your thumb and index finger. Use your string to mark off any chord in the circle. What is a chord? (A chord is a line which goes from any point on the outside of a circle to any other point on the outside.) How can we use the string to find the diameter. (The diameter is the longest chord in the circle. It is the one which will use the greatest length of string.) Once you have found the diameter, measure the string. How long is the diameter? Now wrap your string one time around the outside of the jar lid. Measure the string against your ruler. What did we just measure? (We just measured the circumference.) How much did the circumference measure?"

Make a chart of diameters and circumferences on the chalkboard. Ask the student to write their measurements under each heading and to write the chart in their notebooks.

e.g.,

| Diameter | Circumference |
|---|---|
| 2 in. | $6\frac{1}{4}$ in. |
| 4 in. | $12\frac{1}{2}$ in. |

Say, "Look at the diameter and circumference measurements. What pattern do you see?" (In each

**STRATEGY 1:** cont'd

case, the circumference is about 3 times the diameter.) Write on the chalkboard and say, "The circumference of a circle is always a little more than 3 times the diameter." Ask the students to write this in their notebooks.

Say, "If the diameter is 4 inches, about what will the circumference be?" (The circumference will be about 12 inches.) Repeat this procedure using other circles of various sizes.

**4.10.05.03** **find the relationship between radius and circumference**

**STRATEGY 1:** Display the chart created in Strategy 1, P.O. 4.10.05.02. Say, "When we measured the circumference and the diameter of a circle, what did we notice? (We found that the circumference of a circle is a little more than 3 times the diameter.) What do we know about the relationship of the diameter to a radius? (The diameter of a circle is 2 times the radius.) What is the relationship of the radius to the diameter? (The radius is $\frac{1}{2}$ the diameter.) Let's add a column to our chart that compares diameters to circumferences. We will label this new column Radius."

e.g.,

| Radius | Diameter | Circumference |
|---|---|---|
| | 2 in. | $6\frac{1}{4}$ in. |
| | 4 in. | $12\frac{1}{2}$ in. |

Ask the students to fill in the radius where the diameter is 2 inches and 4 inches. Say, "If the diameter is 2 inches, what is the length of the radius? (The radius is 1 inch.) If the diameter is 4 inches, what is the radius?" (The radius is 2

**STRATEGY 1:** cont'd

inches.) Ask the students to fill in the rest of the chart. Say, "What relationship can you see between the radius and the circumference? (The circumference is about 6 times the radius.) Why does this make sense?" (If the circumference is a little more than 3 times the diameter, then the circumference should be a little more than 6 times the radius because the radius is only half as long as the diameter.)

On the chalkboard, write: The circumference of a circle is about 6 times the radius of that circle. Ask the students to write this in their notebooks. Say, "If the radius of a circle is 2 cm, about how long will the circumference be?" (The circumference will be a little more than 12 cm.) Repeat this procedure with other measurements of radii using both customary and metric measurement.

P.O. 4.10.05.01-.02

NAME:______________________ CLASS:__________ DATE:________

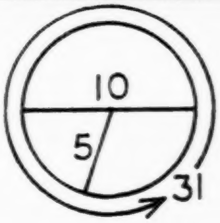
Answer the items below.

① Circle the objects that can help you measure a circumference.

belt knife yarn

stick string cube

②

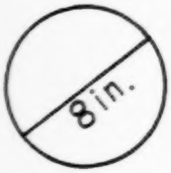


Which number represents:

radius_____ diameter _____

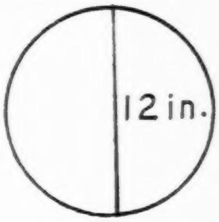
circumference_____

③ Estimate the circumference of each circle below.



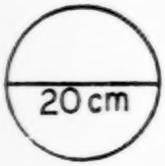
The circumference is about

_______ inches.



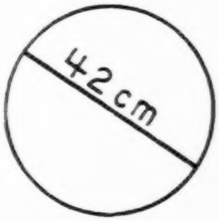
The circumference is about

_______ inches.



The circumference is about

______ cm.



The circumference is about

______ cm.

④ Judith baked a pie that measured 9 inches across. What is the distance around the outside of the pie?

The distance is about____inches.

⑤ Jessie jogs around a track that is 300 meters around. About how long is the diameter of the track?

The diameter is about____meters.

P.O. 4.10.05.03

NAME: ______________________ CLASS: __________ DATE: ________

Estimate the circumference of these objects.

Bicycle tire

radius = 25 cm

Estimated Circumference __________

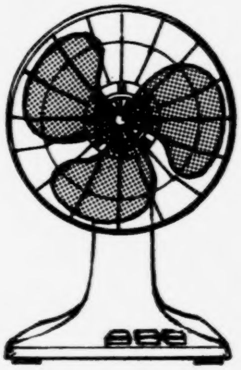
Bracelet

radius = 3 cm

Estimated Circumference __________

Fan

radius = 15 cm



Estimated Circumference __________

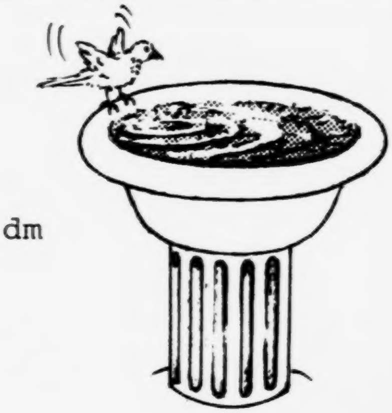
Ring

radius = 1 cm

Estimated Circumference __________

Birdbath

radius = 2 dm



Estimated Circumference __________

Basketball hoop

radius = 8 inches

Estimated Circumference __________

# 4.02.03 ASSOCIATIVE PROPERTY OF ADDITION

(1 lesson)

## PERFORMANCE OBJECTIVES

The student will be able to...

4.02.03.01A use the associative property of addition; e.g.,

$$(18 + 22) + 3 = 18 + (22 + 3)$$
$$40 + 3 = 18 + 25$$
$$43 = 43$$
Therefore, $(18 + 22) + 3 = 18 + (22 + 3)$

*4.02.03.02A solve word problems related to skills learned in this module.
e.g.,

Sally had 132 marbles. Her friend gave her 20 marbles and she bought 100 more. How many marbles did she have in all?

4.02.03

## VOCABULARY

### TERMS

commutative property
associative property

---

### GETTING STARTED 1:

Prepare and distribute sets of interlocking cubes, in two colors, to each group of students. Say, "Make a stack of 9 blue cubes and 6 red cubes. What addition sentence can we use to describe these cubes? (9 + 6 = 15) What other addition sentence can we use?" (6 + 9 = 15) Ask a student to write these number sentences on the chalkboard.

Say, "What do these addition sentences show us? (They show us that the order of the addends does not change the sum.) What do we call this special property of addition?" (It is called the commutative property of addition.) Point to the number sentences on the chalkboard and say, "Since 9 plus 6 and 6 plus 9 both equal 15, we can say they are also equal to each other." On the chalkboard write: 9 + 6 = 6 + 9.

On the chalkboard, write several other addition sentences which demonstrate the commutative property. Replace one addend in each sentence with a frame.

e.g.,

$7 + 4 = \square + 7$ $25 + 18 = 18 + \square$ $\square + 54 = 54 + 72$

Ask the students to use the commutative property of addition to complete each number sentence in their notebooks.

---

### GETTING STARTED 2:

Prepare numeral cards for the digits 0 through 9. Divide the students into two teams. Shuffle the cards and place them face down on a desk. Ask a student from Team A to select 3 cards and display them on the chalk ledge. Say, "The first person to say the sum of the 3 numbers displayed will earn a point for his/her team." After the sum has been named and the point recorded for the appropriate team, shuffle the cards and ask a member of Team B to select the next 3 cards to continue the game. Repeat this procedure until one team earns 10 points.

**4.02.03**

**4.02.03.01** **use the associative property of addition**

**STRATEGY 1:** Prepare and distribute sets of interlocking cubes of three different colors to each group of students. Say, "Make a stack of 7 red cubes and 5 white cubes. How many cubes are in the stack? (There are 12 cubes in the stack.) Now place 3 blue cubes on top of the stack. How many cubes are there in all? (There are 15 cubes in all.) What number sentence describes the cubes in this stack?" (7 + 5 + 3 = 15) Ask a student to write this number sentence on the chalkboard.

Say, "What did we add first? (First we added 7 + 5 for a sum of 12. Then we added 12 + 3 for a sum of 15.) How can we show that we added 7 + 5 first in our example on the chalkboard?" (We can place parentheses around 7 + 5 in the number sentence.) Ask a student to place parentheses around 7 + 5 in the example on the chalkboard.

e.g., (7 + 5) + 3 = 15

Say, "Now separate the colored cubes. Place the stack of 7 red cubes on your desk. Before placing the 5 white cubes and 3 blue cubes on the stack, join these cubes together. How many white cubes and blue cubes do you have? (We have 8 in all.) Now place these 8 cubes on the stack of blue cubes." Ask a student to rewrite the original number sentence on the chalkboard and to place parentheses around the numbers we now added first.

e.g., 7 + (5 + 3) = 15

Say, " What do you notice about both addition sentences? (They have the same addends and the same sum.) How are they different? (The order in which we grouped the addends is different.) Does the way we grouped the addends change the sum? (No.) We call this the associative property of addition."

**STRATEGY 1:** cont'd

On the chalkboard, write the following:

**Associative Property of Addition**

When we add numbers, we can change the way we group the addends. This will not change the sum.

Ask the students to read this definition and to write it in their notebooks.

On the chalkboard, write: (3 + 9) + 8 = 3 + (□ + 8). Say, "How can we find the missing number? (We can use the associative property. Since two of the addends on each side of the equal symbol are the same, the box must represent the third addend. It must be 9.) How can we check?" (We can add the numbers on each side of the equal symbol and see if the sums match.) Ask a student to check. Repeat this procedure with other groups of numbers.

**STRATEGY 2:**

Prepare a set of cards with addition examples having 3 addends. Display one card.

e.g.,

9 + 6 + 4 = □

Say, "To add these numbers mentally, which numbers could we add first?" (We could add 9 + 6 = 15 and then add 4 for a total of 19.) Ask a student to write this number sentence on the chalkboard.

e.g., (9 + 6) + 4 = 19

Say, "How else can we add?" (We can add 6 plus 4 for a sum of 10 if we change the way we group the addends. Then we could add 9 more for a sum of 19.) Ask a student to write this number sentence on the chalkboard.

e.g.,

9 + (6 + 4) = 19

Say, "Since both number sentences equal 19 they are also equal to each other." On the chalkboard, write: (9 + 6) + 4 = 9 + (6 + 4).

**STRATEGY 2:**
cont'd

Say, "How are the addends on both sides of the equal symbol the same? (They are the same numbers.) How are they different?" (The order in which we grouped the addends is different.) Write the following on the chalkboard:

> **Associative Property of Addition**
> When we add numbers, we can change the way we group the addends. This will not change the sum.

Ask the students to write this in their notebooks. Write an example on the chalkboard and ask the students to write it in their notebooks.

e.g.,

$$27 + 16 + 44 = \square$$

Say, "First we can add 27 plus 16 for a sum of 43, and then we can add 44 to 43. What will the sum be? (The sum will be 87.) How else could we add these numbers? (We can add 16 plus 44 for a sum of 60. Then we can add 27 plus 60.) What will the sum be?" (The sum will be 87.) Ask the students to write the sum in the box. Say, "Does the way we group addends change the sum?" (No.)

Write the following on the chalkboard:

$$(25 + 24) + 17 = 25 + (24 + \square)$$

Say, "What number belongs in the box? (17 belongs in the box.) How do you know?" (Both groups of addends are equal. If two of the addends are the same, the third addend must also be the same, even if we group them differently.) Ask a student to complete the number sentence on the chalkboard.

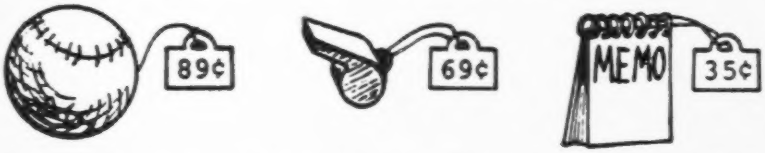
Repeat this procedure with other examples, using 2- and 3-digit numbers.

4.02.03

4.02.03.02 **solve word problems related to skills learned in this module**

**STRATEGY 1:** Prepare and display 3 items with price tags.

e.g.,



Say, "Mary Ellen is the cashier in Fred's Stationery Store. She likes to add amounts starting with the most expensive item and working down to the least expensive item. Kenneth is the cashier in Burt's Variety Store. He likes to add amounts starting with the least expensive item and working his way up to the most expensive item. At Fred's, Mary Ellen added the cost of the ball, the whistle, and the memo pad. At Burt's, Kenneth added the same 3 items. Write the two addition sentences which show how the two cashiers added. Use parentheses to show what was added first. How much did the 3 items cost?"

Say, "What are we asked to find? (We are asked to find the cost of the 3 items.) How can we find the cost? (We must add.) How should we add the items?" (The problem asks us to add the prices two ways, from greatest to least and least to greatest.) Ask the students to do this in their notebooks as two students work at the chalkboard.

e.g.,

(89¢ + 69¢) + 35¢ = $1.93

(35¢ + 69¢) + 89¢ = $1.93

Say, "How much did the 3 items cost? (They cost $1.93.) Did it matter which numbers were added first. (No.) What property of addition does this represent. (This represents the associative property of addition.) Besides changing the way we grouped the addends, we also changed the order of the addends. Did this change the sum? (No.) What property of addition does this represent?" (This represents the commutative property of addition.)

**STRATEGY 2:** Prepare and display a word problem.

e.g.,

> Kathleen wanted to figure out how many ways she could add 3 numbers. She added the numbers 36, 19, and 35. Show the different orders in which she could have added. Use parentheses to show which she added first.

Say, "What do we have to find?" (We have to find the different ways Kathleen could have added the 3 numbers). What is one order in which we can add?" (We can add 36 + 19 + 35.) Ask a student to write this example on the chalkboard, using parentheses to show which pair of numbers will be added first. Ask a student to solve it on the chalkboard as the students solve it in their notebooks. Repeat this procedure by asking the students to continue to write the numbers in different orders and adding them.

e.g.,

$(36 + 19) + 35 = 90$
$(36 + 35) + 19 = 90$
$(19 + 36) + 35 = 90$
$(19 + 35) + 36 = 90$
$(35 + 19) + 36 = 90$
$(35 + 36) + 19 = 90$

Say, "How many different ways did we add 36, 19, and 35? (We found 6 different ways.) What do you notice about the sum? (The sum is always the same.) Does the order in which we group the addends make any difference? (No. The sum is always the same.) Does the order of the addends change the sum?" (No.)

Repeat this procedure with other problems.

**Note:** Where appropriate ask the students to rewrite the numbers vertically and add. This will assist less able students and also reinforce writing addition examples both vertically and horizontally.

P.O. 4.02.03.01-.02

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

Use the associative property of addition to complete the following number sentences.

1.

(26 + 37) + 14 = ☐

26 + (37 + 14) = ☐

26 + (37 + 14) = (26 + 37) + ____

2.

(75 + 11) + 26 = ☐

75 + (11 + 26) = ☐

(75 + 11) + ___ = 75 + (11 + 26)

Use parentheses to show two different ways to find the sum.

3.

478 + 816 + 975 = ☐

478 + 816 + 975 = ☐

4.

$.56 + $.85 + $.29 = ☐

$.56 + $.85 + $.29 = ☐

Find the cost in two different ways for 1 adult, 1 child, and 1 senior citizen to attend the movies. Use the associative property of addition.

5.

Movie Ticket Prices

| | | | |
|---|---|---|---|
| Adults | $3.50 | Children | $1.75 |
| Senior Citizens | $2.15 | | |

A.

B.

Unit 50

## 4.02.04 ADDITION OF 5- AND 6-DIGIT NUMBERS WITH OR WITHOUT REGROUPING (EXCHANGE) IN ONE OR MORE PLACES

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.02.04.01A add two or more 5-digit numbers and check; e.g,

```
               check                      check
  '            '               '   '      '   '
  59,624       32,232          38,654     13,291
 +32,232      +59,624         +13,291    +38,654
 -------      -------         -------    -------
  91,856       91,856          51,945     51,945
```

4.02.04.02A add two or more 6-digit numbers and check; e.g.,

```
                       check
    '  ''   '
   $2,324.06        ↑ add up
    1,434.62        |
 +  3,243.13        |
 -----------
   $7,001.81
```

4.02.04.03A solve word problems related to skills learned in this module. e.g.,

During the month of June, 15,238 people visited the zoo. There were 22,465 visitors during July and 18,562 visitors during August. How many people went to the zoo during the 3 months?

**4.02.04**

## VOCABULARY

### TERMS

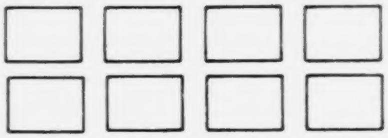
addends
ten thousands
hundred thousands

---

### GETTING STARTED 1:

Prepare a place value chart through the thousands place and a set of playing cards without the tens, jacks, or queens. Say, "This is a special number deck. Tens, jacks, and queens are missing. All the cards have their face value, except kings and aces. Kings are worth 0 and aces are worth 1." Shuffle the deck and place it on a desk, face down. Ask a student to select any 8 cards, without looking, and place them in two rows of 4.

e.g.,



Ask the student to turn over 4 cards, one at a time, and read each number. Ask another student to write the digits which the cards represent on the place value chart while the other students write them in their notebooks. Repeat this procedure with the other 4 cards to form the second addend. Place an addition symbol to the left of the second addend and a line below the addends.

e.g.,

| | Thousands | Hundreds | Tens | Ones |
|---|---|---|---|---|
| | 4 | 6 | 0 | 2 |
| + | 2 | 5 | 7 | 9 |

Say, "We now have an addition example to solve." Ask a student to read the example aloud. Ask a student to solve the example at the chalkboard as the other students solve it in their notebooks. Say, "In which places did we have to regroup? (We had to regroup 10 ones for 1 ten and 10 hundreds for 1 thousand.) What is the sum? (The sum is 7,181.) How can we check the answer?" (We can add up.) Ask the students to check the answer.

Repeat this procedure to create other 3- or 4-digit addition examples to solve.

## GETTING STARTED 2:

Prepare and display a set of numeral cards for the digits 0 through 9 and a set of cards with the names of the place values, ones through hundred thousands. Shuffle each set of cards and place each set face down on a desk. Say, "We will build a 5-digit number. How many places does a 5-digit number have? (A 5-digit number has 5 places.) What are the names of the 5 places?" (The names to the places are ones, tens, hundreds, thousands, and ten thousands.) When we write a 5-digit number, where do we place the comma?" (We place the comma between the hundreds place and the thousands place.) Ask a student to select a card from each pile.

e.g.,

$\boxed{6}$ $\boxed{\text{thousands}}$

Say, "In your notebook, write a 5-digit number that has a 6 only in the thousands place. Ask several students to read their numbers aloud and write them on the chalkboard.

e.g.,

46,287
26,108
76,295

Repeat this procedure to create other 5-and 6-digit numbers.

**4.02.04**

**4.02.04.01** **add two or more 5-digit numbers and check**

**STRATEGY 1:** Adapt Strategy 1 or 2, P.O. 4.02.02.01 (P.49S.1)

**4.02.04.02** **add two or more 6-digit numbers and check**

**STRATEGY 1:** Prepare a place value chart through hundred thousands and a deck of playing cards as in Getting Started 1. Shuffle the cards and ask a student to place 12 cards in two rows of 6 cards each, and to read the numbers aloud. Ask another student to record the numbers on the place value chart on the chalkboard. Place a plus symbol in the example and draw a line below the example.

e.g.,

| Hundred Thousands | Ten Thousands | Thousands | Hundreds | Tens | Ones |
|---|---|---|---|---|---|
| 2 | 4 | 9 | 3 | 0 | 6 |
| + 3 | 7 | 8 | 9 | 4 | 5 |
| | | | | | |

Say, "How many digits are in each number? (There are 6 digits in each number.) When we add will we have to regroup? (Yes, we will have to regroup ones to tens, hundreds to thousands, thousands to ten thousands, ten thousands to hundred thousands.) How do you know?" (In each of those columns we will have a sum greater than 9.) What do you estimate the sum will be? (The sum will be about 600,000.) How do you know?" (If I round each addend to the nearest hundred thousand, and add the rounded numbers, my estimate is 600,000.)

e.g.,

```
 249,306 rounds to 200,000
+378,945 rounds to 400,000
                  600,000 estimated sum
```

**STRATEGY 1:** cont'd

Ask a student to complete the addition on the place value chart as the other students complete it in their notebooks. When the example has been completed, say, "How many digits are in the sum? (There are 6 digits in the sum.) What is the sum?" (The sum is 628,251.) How do you know this answer is reasonable?" (It is close to our estimate of 600,000. Therefore, it is reasonable.) Ask the students to check their addition by adding up.

Repeat this procedure to create and add other examples with two or more 6-digit addends.

**STRATEGY 2:** Prepare and display a series of 6-digit numbers. Draw a ring around two of these numbers.

e.g.,

| | | |
|---|---|---|
| 326,544 | 172,685 | $\boxed{291,856}$ |
| 576,148 | $\boxed{432,918}$ | 396,215 |
| 936,004 | 612,047 | 895,480 |

Ask a student to read the two circled numbers aloud and to write them in an addition example on the chalkboard as the other students write them in their notebooks.

e.g.,

$$\begin{array}{r} 432{,}918 \\ +291{,}856 \\ \hline \end{array}$$

Say, "Does it matter which of the two addends we write first? (No.) Why not? (The commutative property of addition tells us that changing the order of addends does not change the sum.) Large numbers are added in the same way as smaller numbers. What will we do whenever the sum in any one column is greater than 9? (If the sum in any column is greater than 9, we will regroup for one more in the next higher column.) Where will we have to regroup in this example?" (We will have to regroup ones for

**STRATEGY 2:** cont'd

tens, hundreds for thousands, and ten thousands for hundred thousands.) How can we estimate the sum?" (We can round each addend to the nearest hundred thousand and add the rounded numbers.) Ask a student to show the estimate on the chalkboard as the other students work in their notebooks.

e.g.,

```
 432,918 rounds to 400,000
+291,856 rounds to 300,000
                   700,000 estimated sum
```

Ask the students to find the sum. Say, "What is the sum? (The sum is 724,774.) How do we know this sum is reasonable? (It is close to our estimate of 700,000.) How can we check the sum?" (We can add up.) Ask the students to check their work. Repeat this procedure adding other 6-digit numbers from the list on the chalkboard.

**4.02.04.03** **solve word problems related to skills learned in this module**

**STRATEGY 1:** Prepare and display a word problem.

e.g.,

A computer recorded the following attendance figures for 4 days at the Sports Arena:

| Day | Attendance |
|---|---|
| Thursday | 32,564 |
| Friday | 29,972 |
| Saturday | 27,566 |
| Sunday | 31,584 |

On which 2 days was the total attendance 57,538?

**STRATEGY 1:** cont'd

Ask a student to read the problem aloud. Say, "What information is given in the problem? (The attendance figures fòr 4 days are given.) What are we asked to find? (We are asked to find the two days on which the total attendance is 57,538.) How can we do this? (We can add the attendance for each combination of two days, Thursday and Friday, Thursday and Saturday, Thursday and Sunday, Friday and Saturday, ...) What shortcut can we use so we won't have to add every combination of two days?" Record the responses on the chalkboard.

e.g.,

- We can round the attendance figures and mentally add the rounded numbers to see which estimates are close to 57,438.
- We can look at the digits in the ones column and only add the pairs of numbers where the sum of the ones digits is 8.

Ask the students to solve the problem using one of the strategies listed on the chalkboard and to check their addition by adding up. Say, "What is the answer to the problem? (The total attendance on Friday and Saturday was 57,538.) Which was the fastest way to solve the problem? Why do you think this so?"

Repeat this procedure using other problems involving addition of 5-and 6-digit numbers.

P.O. 4.02.04.01 & .03

NAME:__________________________________ CLASS:__________ DATE:________

Follow the directions below.

A. Estimate each sum by rounding the addends to the nearest ten thousand. Complete each example and check by adding up.

| estimate | solve | estimate | solve |
|---|---|---|---|
| 50,000<br>+30,000<br>80,000 | 48,132<br>+27,059 | | 26,919<br>+11,997 |
| estimate | solve | estimate | solve |
| | 39,186<br>+21,216 | | \$555.21<br>+ 300.99 |
| estimate | solve | estimate | solve |
| | 68,797<br>+28,790 | | 18,952<br>+56,705 |

B. Solve each problem.

On a giant ant farm in Africa, 21,156 ants were born in 1985. The following year, 32,899 ants were born. How many ants were born during the two years?

__________ ants were born.

There is not enough food grown in parts of Africa to feed the people. One country air lifted 72,632 tons of food. Another country air lifted 10,038 tons of food. How much food did both countries air lift?

__________ tons of food

**Do you remember?**

| | | | | | |
|---|---|---|---|---|---|
| 4)73 | check | 3)684 | check | 5)561 | check |

P.O. 4.02.04.02-.03

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

A. Estimate each sum by rounding the addends to the greatest place value. Complete each example and check by adding up.

| estimate | solve | estimate | solve |
|---|---|---|---|
| 800,000<br>+100,000<br>400,000 | 845,132<br>+119,880 | | $2,654.35<br>+ 6,148.05 |
| estimate | solve | estimate | solve |
| | $4,035.06<br>+ 2,113.69 | | 287,600<br>+396,730 |

B. Solve each problem.

Ellen and Jason Crane are buying a new car. Ellen saved $6,080.50. Jason saved $3,495.00. How much did they save together?

They saved _______ together.

375,921 cars were made in Detroit. 429,882 cars were made in Japan. How many cars were made in Detroit and Japan?

_____ cars were made in Detroit and Japan.

C. These problems are missing questions. Read the information, write a question for each, and then solve each problem.

136,688 salmon swam upstream in Colorado during 1978. During the next year, 236,510 salmon swam upstream.

Question: ________________

________________________

Answer: ________________

A bank paid $2,411.02 in interest to John Crane and $1,009.99 in interest to Sally Crane.

Question: ________________

________________________

Answer: ________________

# SHARPENING YOUR SKILLS

**Units 48, 49, 50**

**Name** ____________________ **Class:** ____________ **Date:** ____________

1. The distance around a circle is called the __________.

2. If the diameter of a circle is 5 cm, the circumference of that circle is about __________ cm.

3. If the radius of a circle is 3 inches, the circumference of that circle is about ________ inches.

4. What number belongs in the box?

   (42 + 16) + 5 = 42 + (☐ + 5)

   ⓐ 63 ⓒ 21

   ⓑ 16 ⓓ Not Here

5. What number belongs in the box?

   (☐ + 20) + 10 = 29 + (20 + 10)

   ⓔ 20 ⓖ 29

   ⓕ 30 ⓗ Not Here

6. What sum will make both number sentences true?

   (12 + 18) + 6 = ☐

   12 + (18 + 6) = ☐

   ⓐ 36 ⓒ 30

   ⓑ 24 ⓓ Not Here

7. 
$$\begin{array}{r} 325{,}439 \\ \underline{+218{,}266} \end{array}$$

   ⓔ 107,173 ⓖ 542,805

   ⓕ 542,714 ⓗ Not Here

8. Find the sum.

$$\begin{array}{r} 18{,}235 \\ 21{,}406 \\ \underline{+32{,}151} \end{array}$$

9. Find the sum.

$$\begin{array}{r} \$1{,}256.29 \\ \underline{+\ 6{,}588.12} \end{array}$$

10. A school district recorded the following attendance for three days:

    Monday - 12,404 students
    Tuesday - 10,845 students
    Wednesday - 11,964 students

    Find the total attendance for the 3 days.

    ____________ students

Unit 51

## 4.03.03 SUBTRACTION OF 5- AND 6-DIGIT NUMBERS WITH OR WITHOUT REGROUPING (EXCHANGE) IN ONE OR MORE PLACES

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.03.03.01A subtract a 2-, 3-, 4-, 5- or 6-digit number from a 5- or 6-digit number and check;
e.g.,

$$\begin{array}{r} \overset{7}{\cancel{8}}\overset{16}{\cancel{6}},972 \\ -59,851 \\ \hline 27,121 \end{array} \qquad \begin{array}{r} \text{check} \\ \overset{1}{2}7,121 \\ +59,851 \\ \hline 86,972 \end{array} \qquad \begin{array}{r} \$\overset{3}{\cancel{4}},\overset{13}{\cancel{3}}\overset{1}{\cancel{2}}\overset{\overset{10}{\cancel{0}}}{\cancel{1}}.\overset{11}{\cancel{1}}6 \\ -\quad 403.91 \\ \hline \$3,917.25 \end{array} \qquad \begin{array}{r} \text{check} \\ \$\overset{1}{3},9\overset{1}{1}\overset{1}{7}.25 \\ +\quad 403.91 \\ \hline \$4,321.16 \end{array}$$

4.03.03.02A subtract a 2-, 3-, 4-, 5-, or 6-digit number from 10,000 and its multiples and 100,000 and its multiples and check;
e.g.,

$$\begin{array}{r} \overset{0}{\cancel{1}}\overset{\overset{9}{\cancel{10}}}{\cancel{0}},\overset{\overset{9}{\cancel{10}}}{\cancel{0}}\overset{\overset{9}{\cancel{10}}}{\cancel{0}}\overset{10}{\cancel{0}} \\ -\ 5,986 \\ \hline 4,014 \end{array} \qquad \begin{array}{r} \text{check} \\ \overset{1}{4},\overset{1}{0}\overset{1}{1}4 \\ +5,986 \\ \hline 10,000 \end{array} \qquad \begin{array}{r} \overset{0}{\cancel{1}}\overset{\overset{9}{\cancel{10}}}{\cancel{0}}\overset{\overset{9}{\cancel{10}}}{\cancel{0}},\overset{\overset{9}{\cancel{10}}}{\cancel{0}}\overset{\overset{9}{\cancel{10}}}{\cancel{0}}\overset{10}{\cancel{0}} \\ -\ 54,678 \\ \hline 45,322 \end{array} \qquad \begin{array}{r} \text{check} \\ \overset{1}{4}\overset{1}{5},\overset{1}{3}\overset{1}{2}2 \\ +54,678 \\ \hline 100,000 \end{array}$$

4.03.03.03A solve word problems related to skills learned in this module.
e.g.,

> There were 134,283 people at the automobile show during the first week and 73,142 people during the second week. How many more people attended during the first week than the second week?

4.03.03

## VOCABULARY

### TERMS

minuend
subtrahend

ten thousands
hundred thousands

---

### GETTING STARTED 1:

Prepare a group of subtraction examples having 4-digit minuends and 2-, 3-, or 4-digit subtrahends, e.g.,

$$\begin{array}{r} 5{,}342 \\ \underline{-1{,}571} \end{array}$$

Divide the class into two teams. Say, "I will dictate a subtraction example to you. Each of you will solve the example. The student who is the first to complete the example correctly will earn one point for his/her team. Here is the first example. Write it in your notebooks. The minuend is five thousand, three hundred forty-two. The subtrahend is one thousand, six hundred seventy-one." When the first student to complete the example has stated his/her answer, ask him/her to write the example on the chalkboard as the remaining students check the answer using addition. Assign the point to the appropriate team. Continue the game until one team scores 5 points.

---

### GETTING STARTED 2:

Prepare and distribute 4 pieces of paper to each student. Also, prepare a set of word problems requiring either addition, subtraction, multiplication, or division to solve them. Ask the students to place one of the operation symbols (+, -, x, ÷) on each piece of paper. The symbols should be large and dark. Say, "I will read a word problem to you. Think about the information given in the problem and what you are asked to find. After reading the problem, I will wait 15 seconds. When I say, 'Time', hold up the paper with the symbol showing the operation needed to solve the problem." After the students display the symbol, say, "How did you know to subtract (add, multiply, divide)?" (Accept appropriate responses.) Repeat this procedure until sufficient practice has been given. As a variation, the students may take turns reading the problems to their classmates or creating their own word problems to read to their classmates.

**4.03.03**

**4.03.03.01** **subtract a 2-, 3-, 4-, 5-, or 6- digit number from a 5- or 6-digit number and check**

**STRATEGY 1:** Prepare and display a place value chart through hundred thousands. Write a subtraction example on the chart.

e.g.,

| Hundred Thousands | Ten Thousands | Thousands | Hundreds | Tens | Ones |
|---|---|---|---|---|---|
|  | 6 | 7 | 9 | 8 | 3 |
| - |  | 8 | 6 | 9 | 9 |
|  |  |  |  |  |  |

Ask a student to read the example aloud. Say, "The chart will help us read the numbers and keep them in columns. Copy the chart and the example into your notebook." After the students have written it in their notebooks, say, "Why can't we subtract in the ones column? (We can't subtract the ones because there are fewer ones in the minuend than in the subtrahend.) How can we get more ones so we will be able to subtract? (We can exchange 1 ten for ten ones.) How many tens will we have then? (We will have 7 tens.) How many ones will we have?" (We will have 13 ones.) Ask a student to show the exchange at the chalkboard as the other students work in their notebooks. Say, "How much is 13 minus 9?" (13 minus 9 equals 4.) Ask a student to write a 4 in the ones place in the difference on the chalkboard as the other students write it in their notebooks.

Continue this procedure to complete the example. Say, "Why didn't we exchange in every column? (We only need to exchange when the digit in the minuend in any column is less than the digit in the subtrahend.)

What is the difference? The difference is 59,284.) How can we check our answer?" (We can add the difference to the subtrahend. The result should be the minuend.) Ask the students to check their work. Repeat this procedure using other examples.

**STRATEGY 2:** Adapt Strategy 2, P.O. 4.03.02.01 (p.50S.1), for use with 5- and 6-digit minuends.

**4.03.03.02** **subtract a 2-, 3-, 4-, 5-, or 6-digit number from 10,000 and its multiples and 100,000 and its multiples and check**

**STRATEGY 1:** Adapt Strategy 2, P.O. 4.03.01.04 (p.16S.7), for use with minuends of 10,000 and its multiples and 100,000 and its multiples.

**STRATEGY 2:** Adapt Strategy 2, P.O. 4.03.02.01 (p.50S.1), for use with examples such as:

$$\begin{array}{r} 2,146 \\ +\boxed{\phantom{0000}} \\ \hline 10,000 \end{array} \qquad \begin{array}{r} 153,248 \\ +\boxed{\phantom{000000}} \\ \hline 200,000 \end{array}$$

**4.03.03.03** **solve word problems related to skills learned in this module**

**STRATEGY 1:** Prepare and display a word problem.

e.g.,

> Mr. Burns sold his car for $2,000.00. He used $654.75 of that money to buy a new television. How much money did he have left?

Ask a student to read the problem aloud. Say, "What are we asked to find? (We must find how much money Mr. Burns had left after buying the television.) How can we solve the problem?" (We can subtract the amount he spent for the television from $2,000.00.) Ask a student to write the example needed to solve this problem on the chalkboard.

**STRATEGY 1:** cont'd

e.g.,

$$\begin{array}{rr}
 & \$2,000.00 \\
- & 654.73 \\ \hline
\end{array}$$

Ask a student to solve the problem at the chalkboard as the other students solve it in their notebooks.

e.g.,

$$\begin{array}{ccccccccc}
 & & & 9 & 9 & 9 & & 9 & \\
 & 1 & & \cancel{10} & \cancel{10} & \cancel{10} & & \cancel{10} & 10 \\
\$ & \cancel{2} & , & \cancel{0} & \cancel{0} & \cancel{0} & . & \cancel{0} & \cancel{0} \\
- & & & 6 & 5 & 4 & . & 7 & 3 \\ \hline
\$ & 1 & , & 3 & 4 & 5 & . & 2 & 7
\end{array}$$

Say, "What is the difference? (The difference is $1,345.27.) How can we check the difference?" (We can add the difference to the subtrahend. The result should be the minuend.) Ask the students to check their work as one student checks the example at the chalkboard.

e.g.,

$$\begin{array}{ccccccccc}
\multicolumn{9}{c}{\underline{\text{check}}} \\
 & 1 & & 1 & 1 & 1 & & 1 & \\
\$ & 1 & , & 3 & 4 & 5 & . & 2 & 7 \\
+ & & & 6 & 5 & 4 & . & 7 & 3 \\ \hline
\$ & 2 & , & 0 & 0 & 0 & . & 0 & 0
\end{array}$$

Say, "What is the answer to the problem?" (Mr. Burns had $1,345.27 left after buying the television.) Repeat this procedure with other word problems.

P.O. 4.03.03.01-.02

NAME: ____________________ CLASS: __________ DATE: __________

Solve and check each example. Write the letter of each example above the answer at the bottom of the page to complete the message.

| | | |
|---|---|---|
| **solve** **check**<br>300,000 ☐<br>− 189 + 189<br>300,000<br>A | **solve** **check**<br>88,356<br>− 32,196<br>T | **solve** **check**<br>$500.00<br>− 493.88<br>$<br>C |
| **solve** **check**<br>$3,000.00<br>− 189.50<br>E | **solve** **check**<br>100,000<br>− 43,841<br>S | **solve** **check**<br>$1,565.90<br>− 868.09<br>P |
| **solve** **check**<br>91,884<br>−35,721<br>F | **solve** **check**<br>200,000<br>− 18,950<br>R | **solve** **check**<br>61,328<br>− 5,166<br>H |

If you can read this message,

| | | | | |
|---|---|---|---|---|
| 56,160 | 56,162 | 299,811 | 56,160 | 56,159 |

| | | | | | | |
|---|---|---|---|---|---|---|
| $697.81 | $2,810.50 | 181,050 | 56,163 | $2,810.50 | $6.12 | 56,160 ! |

P.O. 4.03.03.03

NAME: ____________________ CLASS: __________ DATE: ________

Solve the problems below. Check your work.

① Mr. Gray went grocery shopping with $100.00. He spent $84.23. How much money did he have left?

He had __________ left.

② A city's police force has 18,630 members. If 3,557 are women, how many are men?

__________ are men.

③ There are 250,000 miles between the Earth and the Moon. A spaceship has already traveled 463 miles into space. How much further must it go to reach the Moon?

__________ miles

④ People sleep an average of 28,800 seconds a night. They have dreams for about 3,945 seconds. How many seconds do people spend sleeping without dreaming?

__________ seconds

Do you remember?

$3 \times \frac{1}{8} = \square$

$2 \times \frac{3}{6} = \square$

$4 \times \frac{2}{9} = \square$

$2 \times \frac{1}{3} = \square$

Unit 52

## 4.04.04 MULTIPLICATION OF 4- AND 5- DIGIT NUMBERS BY A 1-DIGIT NUMBER

(2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.04.04.01A multiply 1,000 and 10,000, and multiples of 1,000 and 10,000, by a 1-digit number;

e.g.,

$$\begin{array}{r} 1{,}000 \\ \times\quad 2 \\ \hline 2{,}000 \end{array} \qquad \begin{array}{r} 10{,}000 \\ \times\quad 2 \\ \hline 20{,}000 \end{array} \qquad \begin{array}{r} 3{,}000 \\ \times\quad 2 \\ \hline 6{,}000 \end{array} \qquad \begin{array}{r} 30{,}000 \\ \times\quad 2 \\ \hline 60{,}000 \end{array}$$

4.04.04.02A multiply 4-digit numbers by a 1-digit number without regrouping (exchange);

e.g.,

$$\begin{array}{r} 2{,}341 \\ \times\quad 2 \\ \hline 4{,}682 \end{array}$$

4.04.04.03A multiply 4-digit numbers by a 1-digit number with regrouping (exchange);

e.g.,

$$\begin{array}{r} \overset{1}{2}{,}4\overset{1}{1}5 \\ \times\quad 3 \\ \hline 7{,}245 \end{array}$$

4.04.04.04A solve word problems related to skills learned in this module.

e.g.,

> The school cafeteria prepares 1,354 lunches each day. How many lunches are prepared in 5 days?

**4.04.04**

## VOCABULARY

### TERMS

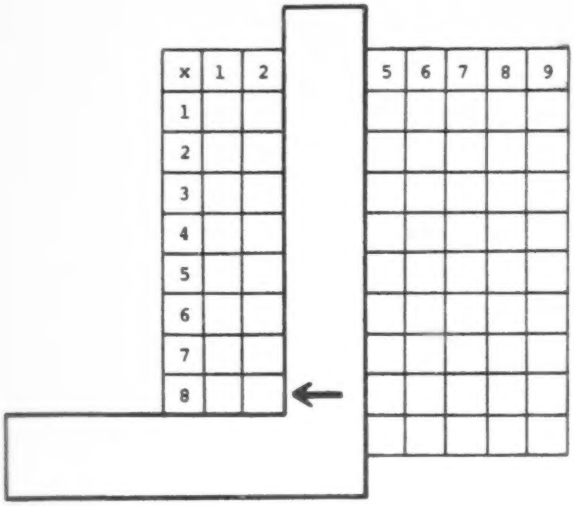
product
factors
multiplicand
multiplier

---

## GETTING STARTED 1:

Prepare and distribute to each student a multiplication grid with only the factors written on the grid and a reverse "L" cut from construction paper or oak tag. Say, "We will use this grid to practice our multiplication facts. Use the reverse "L" to locate the box where we will write the product of 8 times 2.

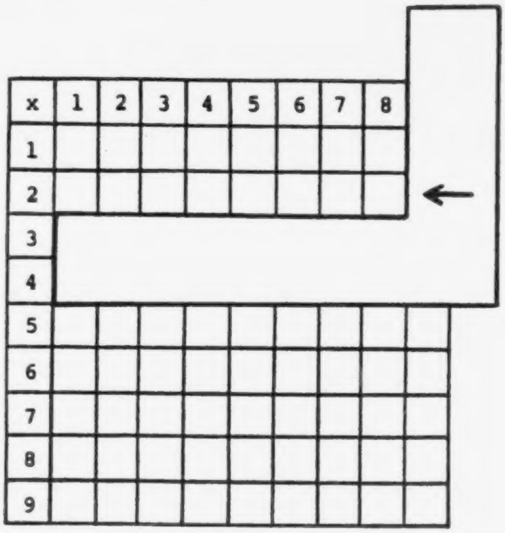
e.g.,



Say, "What is the product? (The product is 16.) Write the product in the square next to the arrow. Say, "How can we be sure the answer is 16? (We can count the number of squares to the left of the reverse "L".) Can you check it another way? (Yes, since multiplication is commutative, we can multiply 2 times 8. The product is still 16.) Ask the students to use the reverse "L" to find the box where the product of 2 times 8 will be written.

**GETTING STARTED 1:** cont'd

e.g.,



Repeat this procedure until all the products through 9 times 9 have been written in the multiplication grid.

**GETTING STARTED 2:**

Prepare a demonstration set of squared material (hundreds and tens). Write the following multiplication examples on the chalkboard:

$$\begin{array}{r} 40 \\ \underline{\times\ 2} \end{array} \qquad \begin{array}{r} 400 \\ \underline{\times\ \ 2} \end{array}$$

Say, "How can we solve these examples mentally?" (If we know that 2 times 4 is 8, we know that the product of 2 times 40 will be ten times greater than 8, or 80. We also know that the product of 2 times 400 will be a hundred times greater than 8, or 800.) Ask a student to write the product for each example as the other students write them in their notebooks. Say, "How can we prove that the products are correct using the squared material?" (We can represent 2 times 40 by displaying 2 groups with 4 tens in each.) Ask a student to tape the needed squared material to the chalkboard. Say, "How many tens are there in 2 groups of 4 tens each?" (There are 8 tens, or 80.) Continue this procedure with 2 groups of 4 hundreds taped to the chalkboard to prove that 2 times 400 equals 800.

Repeat this procedure using other examples which the student can solve mentally.

**4.04.04**

**4.04.04.01** **multiply 1,000 and 10,000, and multiples of 1,000 and 10,000, by a 1-digit number**

**STRATEGY 1:** Prepare and distribute place value charts through ten thousands and a supply of chips of 2 different colors to each student or group of students. Say, "The red chips will represent thousands and the blue chips will represent ten thousands." Write several multiplication examples, with one factor being 1,000 or a multiple of 1,000, on the chalkboard.

e.g.,

$$\begin{array}{r} 1{,}000 \\ \times\quad 3 \\ \hline \end{array} \qquad \begin{array}{r} 2{,}000 \\ \times\quad 4 \\ \hline \end{array} \qquad \begin{array}{r} 8{,}000 \\ \times\quad 2 \\ \hline \end{array}$$

Ask a student to read the first example aloud. Say, "How can we represent 1,000? (We can place a red chip in the thousands place on our charts.) How can we represent 3 times 1,000?" (We can show 3 groups of 1 red chip each.) Ask the students to demonstrate this on their place value charts.

e.g.,

| Ten Thousands | Thousands | Hundreds | Tens | Ones |
|---|---|---|---|---|
| | ● | | | |
| | ● | | | |
| | ● | | | |

Say, "How can we find the product?" (We can count the red chips by thousands, 1,000, 2,000, 3,000.) Ask a student to complete the example at the chalkboard as the other students write it in their notebooks. Repeat this procedure to complete the remaining examples.

e.g.,

$$\begin{array}{r} 1{,}000 \\ \times\quad 3 \\ \hline 3{,}000 \end{array} \qquad \begin{array}{r} 2{,}000 \\ \times\quad 4 \\ \hline 8{,}000 \end{array} \qquad \begin{array}{r} 8{,}000 \\ \times\quad 2 \\ \hline 16{,}000 \end{array}$$

**STRATEGY 1:** cont'd

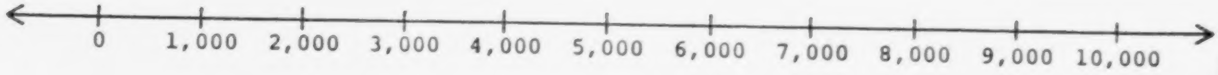
Say, "What pattern do you notice in these examples?" (We can find the product by placing three zeros in the product and then multiplying the 1-digit factor and the digit in the thousands place.) Ask the students to use this shortcut to solve the following examples mentally:

$$\begin{array}{r} 3{,}000 \\ \underline{\times \quad 4} \end{array} \quad \begin{array}{r} 2{,}000 \\ \underline{\times \quad 7} \end{array} \quad \begin{array}{r} 5{,}000 \\ \underline{\times \quad 2} \end{array} \quad \begin{array}{r} 4{,}000 \\ \underline{\times \quad 4} \end{array} \quad \begin{array}{r} 9{,}000 \\ \underline{\times \quad 2} \end{array}$$

Repeat this procedure with factors of 10,000 and multiples of ten thousand multiplied by a 1-digit number.

**STRATEGY 2:** Prepare and display a number line from 0 through 10,000, counting by thousands.

e.g.,



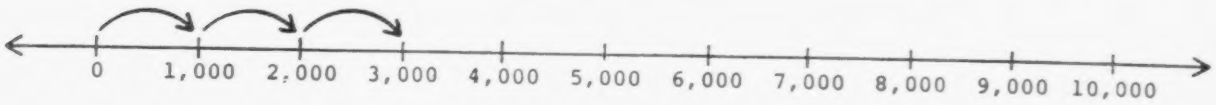
On the chalkboard, write several multiplication examples with 1,000 as one of the factors.

e.g.,

$$\begin{array}{r} 1{,}000 \\ \underline{\times \quad 3} \end{array} \quad \begin{array}{r} 1{,}000 \\ \underline{\times \quad 7} \end{array} \quad \begin{array}{r} 1{,}000 \\ \underline{\times \quad 4} \end{array}$$

Say, "How can we use the number line to find the product of 3 times 1,000?" (We can show 3 jumps of 1,000 on the number line.) Ask a student to demonstrate this on the number line.

e.g.,



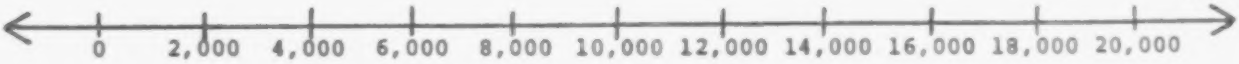
Say, "What is the product of 3 times 1,000?" (3 times 1,000 equals 3,000.) Ask a student to write the product in the example on the chalkboard as the other

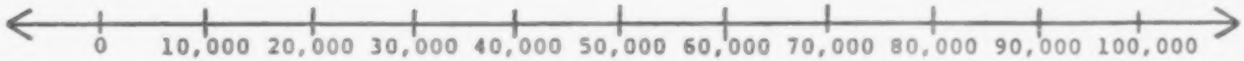
**STRATEGY 2:** cont'd

students write it in their notebooks. Repeat this procedure with the remaining examples on the chalkboard. Say, "What pattern do you notice? (The product has 3 zeros, just as the factor 1,000 has 3 zeros. The digit in the thousands place is the same as the other factor.)

Repeat this procedure using number lines to represent multiples of 1,000 as well as 10,000 and multiples of 10,000.

e.g.,


0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000


0
10,000
20,000
30,000
40,000
50,000
60,000
70,000
80,000
90,000
100,000

**4.04.04.02** **multiply 4-digit numbers by a 1-digit number without regrouping (exchange)**

**STRATEGY 1:** Prepare and display several multiplication examples having a 4-digit multiplicand and a 1-digit multiplier, where no regrouping will be needed.

e.g.,

$$\begin{array}{r} 2,134 \\ \times \quad 2 \\ \hline \end{array} \qquad \begin{array}{r} 4,023 \\ \times \quad 2 \\ \hline \end{array} \qquad \begin{array}{r} 1,221 \\ \times \quad 4 \\ \hline \end{array}$$

Say, "Look at the first example. How can we estimate the product? (We can round 2,134 to the nearest thousand and multiply the rounded number by 2.) What is 2,134 rounded to the nearest thousand?" (2,134 rounds to 2,000.) Write the following on the

**STRATEGY 1:** cont'd

chalkboard:

$$\begin{array}{r} 2{,}134 \\ \underline{\times\quad 2} \end{array} \quad \text{rounds to} \quad \begin{array}{r} 2{,}000 \\ \underline{\times\quad 2} \end{array}$$

Say, " What is the product of 2 times 2,000?" (2 times 2,000 equals 4,000.) Complete the estimation on the chalkboard.

e.g.,

$$\begin{array}{r} 2{,}134 \\ \underline{\times\quad 2} \end{array} \quad \text{rounds to} \quad \begin{array}{r} 2{,}000 \\ \underline{\times\quad 2} \\ 4{,}000 \end{array} \text{ estimated product}$$

Say, "In which place do we begin multiplying? (We always begin multiplying in the ones place.) How many ones are there? (There are 4 ones.) How much is 2 times 4 ones?" (2 times 4 ones equals 8 ones.) On the chalkboard write: 2 x 4 = 8.

Say, "What shall we multiply next? (We shall multiply the tens.) How many tens are there? (There are 3 tens, or 30.) How much is 2 times 3 tens, or 30?" (2 times 3 tens equal 6 tens, or 60.) Continue the multiplication on the chalkboard.

e.g.,

$$\begin{array}{rcrcr} 2 & \times & 4 & = & 8 \\ 2 & \times & 30 & = & 60 \end{array}$$

Repeat this procedure until the digits in each place in the multiplicand have been multiplied by 2.

e.g.,

$$\begin{array}{rcrcr} 2 & \times & 4 & = & 8 \\ 2 & \times & 30 & = & 60 \\ 2 & \times & 100 & = & 200 \\ 2 & \times & 2{,}000 & = & 4{,}000 \end{array}$$

Say, "How can we find the product?" (We can add all the products of each part of the example.) Ask a student to compute the addition at the chalkboard.

**STRATEGY 1:** cont'd

e.g.,

2 x 4 = 8
2 x 30 = 60
2 x 100 = 200
2 x 2,000 = 4,000
4,268

Say, "What is the product? (The product is 4,268.) We can find this same product a shorter way." Point to the original example and say, "How much is 2 times 4 ones?" (2 times 4 ones equals 8 ones.) Ask a student to write an 8 in the ones place in the product.

e.g.,

$$\begin{array}{r} 2{,}134 \\ \times\quad 2 \\ \hline 8 \end{array}$$

Continue multiplying the number in each place by 2 until the example is complete.

e.g.,

$$\begin{array}{r} 2{,}134 \\ \times\quad 2 \\ \hline 4{,}268 \end{array}$$

Say, "Is the product the same as when we multiplied the long way?" (Yes, both products are the same.) How does the product compare to our estimate?" (It is close to our estimate.) Ask several students to use the short method of multiplying to complete the remaining examples at the chalkboard as the other students complete them in their notebooks.

**4.04.04.03** **multiply 4-digit numbers by a 1-digit number with regrouping (exchange)**

**STRATEGY 1:** Adapt Strategy 2, P.O. 4.04.02.05 (p.25S.9), for use with 4-digit numbers.

**4.04.04**

**4.04.04.04** solve word problems related to skills learned in this module

**STRATEGY 1:** Prepare and display the following chart and problem:

**Weights of Cars**

| | |
|---|---|
| Compact car | 2,940 lbs. |
| Full-size car | 4,252 lbs |
| Station wagon | 5,881 lbs. |

> Three car carriers are delivering cars to a dealer in Staten Island. The drivers of these car carriers must know the total weight of the cars they are delivering. If carrier A has 5 compact cars, carrier B has 4 full-size cars, and carrier C has 3 station wagons, what is the total weight of the cars each carrier is delivering?

Ask a student to read the problem aloud. Say, "How many steps are needed to solve this problem?. (3 steps are needed.) Why? (There are 3 separate questions to answer in this problem.) What is the first thing we must find? (We must find the total weight of the 5 compact cars carrier A is delivering.) How can we do that? (We can find the weight of a compact car on the chart and multiply it by 5.) Before we find the exact product, let's estimate the answer. How can we do that?" (We can round the weight of a compact car, 2,940 pounds, to the nearest thousand and multiply the rounded number by 5.) Ask a student to demonstrate this at the chalkboard as the other students work in their notebooks.

**STRATEGY 1:** cont'd

e.g.,

2,940 rounds to 3,000
x 5 x 5
15,000 lbs. estimated product

Ask a student to find the exact weight of the 5 compact cars on the chalkboard as the other students compute the product in their notebooks. Say, "What is the weight of the 5 compact cars carrier A is delivering? (The weight is 14,700 pounds.) How does this compare to our estimate?" (It is close to our estimate of 15,000 so our answer is reasonable.)

Say, "How can we estimate the weight of the cars on carrier B?" (We can round the weight of a full-size car to the nearest thousand and multiply by 4.) Ask a student to show the estimate on the chalkboard as the other students work in their notebooks.

e.g.,

4,252 rounds to 4,000
x 4 x 4
16,000 lbs. estimated product

Ask a student to find the exact weight of the 4 full-size cars on the chalkboard as the other students work in their notebooks. Say, "What is the weight of the 4 full-size cars carrier B is delivering? (The weight is 17,008 pounds.) How does the answer compare to our estimate?" (It is close to our estimate of 16,000 so our answer is reasonable.)

Repeat this procedure to find the total weight of the 3 station wagons carrier C is delivering.

P.O. 4.04.04.01

NAME: CLASS: DATE:

Follow the directions below.

Complete the charts below.

A.

| X | 4 | 40 | 400 | 4,000 | 40,000 |
|---|---|---|---|---|---|
| 2 | 8 | 80 | 800 | | 80,000 |
| 4 | | 160 | 1,600 | 16,000 | |
| 7 | 28 | 280 | 2,800 | | |
| 8 | 32 | 320 | 3,200 | | |

B.

| X | 1 | 10 | 100 | 1,000 | 10,000 |
|---|---|---|---|---|---|
| 3 | 3 | 30 | 300 | | |
| 5 | 5 | 50 | | | |
| 6 | 6 | | 600 | | |
| 9 | 9 | 90 | 900 | | |

Complete each group of examples below.

C.

7 x 1 = 7

7 x 10 = 70

7 x 100 = 700

7 x 1,000 =

7 x 10,000 =

D.

3 x 5 = 15

3 x 50 = 150

3 x 500 = 1,500

3 x 5,000 =

3 x 50,000 =

E.

| | | | |
|---|---|---|---|
| 1,000 | 4,000 | 10,000 | 80,000 |
| x 6 | x 2 | x 3 | x 7 |

F.

8 x = 8,000

5 x = 50,000

P.O. 4.04.04.02 & .04

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

A. Estimate the product. Then find the exact product.

| | |
|---|---|
| 1. estimate<br>4,000<br>x 2<br>solve<br>4,322<br>x 2 | 2. estimate<br>solve<br>2,303<br>x 3 |
| 3. estimate<br>solve<br>1,241<br>x 2 | 4. estimate<br>solve<br>3,012<br>x 3 |
| 5. estimate<br>solve<br>2,021<br>x 4 | 6. estimate<br>solve<br>2,122<br>x 2 |

B. Solve the problems below in two ways, using addition and using multiplication.

| | |
|---|---|
| In 1976, the North City fire department had 2,302 firefighters. In 1986, they had 3 times as many firefighters. How many firefighters did they have in 1986?<br>________ firefighters | A plane flew a distance of 2,120 miles from New York City to Caracas, Venezuela. The plane then flew back to New York City. Find the total mileage for the trip.<br>________ miles |

P.O. 4.04.04.03-.04

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

A. Complete all the examples,
Write Y in the box if you regrouped (exchanged).
Write N in the box if you did not regroup (exchange).

| | | | |
|---|---|---|---|
| ① N | ② ☐ | ③ ☐ | ④ ☐ |
| 2,432<br>x 2 | 4,102<br>x 2 | 4,251<br>x 3 | 6,215<br>x 4 |
| ⑤ ☐ | ⑥ ☐ | ⑦ ☐ | ⑧ ☐ |
| 1,246<br>x 5 | 3,213<br>x 2 | 3,680<br>x 6 | 7,115<br>x 8 |

B. Solve the problems.

1. A copying machine can print 2,315 copies in 1 hour. How many copies can it print in 5 hours?

__________ copies

2. There are 3,600 seconds in 1 hour. How many seconds are there in 4 hours?

__________ seconds

**CHALLENGE!** How can the digits 2, 3, 5, 6, and 8 be arranged in the boxes below to give the greatest product? Find the product.

☐ ☐ ☐ ☐
X ☐

# SHARPENING YOUR SKILLS

Units 51, 52

Name: ____________ Class: ____________ Date: ____________

1\.
700,000
− 8,206

ⓐ 691,894 ⓒ 692,804
ⓑ 691,794 ⓓ Not Here

2. Solve and check.

$854.69
− 275.89

3\.
3,857
x 3

ⓔ 11,571 ⓖ 9312
ⓕ 924,521 ⓗ Not Here

4. Multiply.

40,000
x 4

5\.
4,266
x 5

ⓐ 210,300 ⓒ 21,330
ⓑ 21,396 ⓓ Not Here

6. Ms. Green paid $9,000.00 for her new car. A week later, she saw the same car on sale for $7,998.45. How much would she have saved if she had bought it on sale?

ⓔ $2,998.45 ⓖ $1,001.55
ⓕ $1.55 ⓗ Not Here

7. The Sports Center can seat 16,000 fans. One night, only 6,872 fans showed up to see the hockey game. How many empty seats were there?

ⓐ 22,872 ⓒ 10,872
ⓑ 9,128 ⓓ Not Here

8. 1,236 students attend Greenbriar School. If every student attended school for 5 days in a row, what would the school's total attendance be for the 5 days?

ⓔ 1,258 ⓖ 8,315
ⓕ 103,015 ⓗ Not Here

9. There are 1,760 yards in 1 mile. How many yards are in 4 miles?

____________ yards

## 4.05.06 DIVISION OF 4-DIGIT DIVIDENDS BY 1-DIGIT DIVISORS

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.05.06.01B divide a number through 9,999 by a 1-digit divisor and check using multiplication; e.g.,

$$\begin{array}{r} 4{,}321 \\ 2\overline{)8{,}642} \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 4{,}321 \\ \underline{\times \quad 2} \\ 8{,}642 \end{array} \qquad\qquad \begin{array}{r} 1{,}822 \text{ R2} \\ 3\overline{)5{,}468} \quad \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ \overset{1}{1},822 \\ \underline{\times \quad 3} \\ 5{,}466 \\ \underline{+ \quad 2} \\ 5{,}468 \end{array}$$

4.05.06.02B solve word problems related to skills learned in this module.

e.g.,

Adam has 1,827 marbles. He wants to divide them evenly into 7 boxes. How many marbles will be in each box?

## VOCABULARY

### TERMS

dividend
divisor
quotient
remainder

---

### GETTING STARTED 1:

Prepare one set of cards with the multiples of 10 through 90, the multiples of 100 through 900, and the multiples of 1,000 through 9,000. Prepare another set of cards with the digits 0 through 9. Shuffle both sets of cards and lay them face down on a desk. Divide the students into two teams. Say, "When it is your turn, you will choose one card from each set, say the numbers aloud, and state the product."

e.g., $\boxed{400}$ $\boxed{3}$ $400 \times 3 = 1{,}200$

Say, "For each correct answer, your team will score one point. For each incorrect answer, your team will lose one point." Choose a student from one team to begin. Then choose a student from the other team to continue. Repeat this procedure until one team has scored 10 points.

---

### GETTING STARTED 2:

Prepare a set of division fact cards.

e.g., $\boxed{81 \div 9 = \square}$ $\boxed{42 \div 6 = \square}$ $\boxed{35 \div 7 = \square}$

Divide the students into two teams, designate the closet as home plate, and designate 3 corners as first, second, and third base. Say, "We will play Division Baseball. Team A will be first at bat. I will display a division fact card. If a student on Team A reads the fact and states the correct quotient, he/she will proceed to first base. The next student on Team A will then have a turn. Each student will advance one base for each correct answer. For each incorrect answer, an out will be scored. After 3 outs, Team B comes up to bat." Continue the game for a specific number of innings.

4.05.06

4.05.06.01 **divide a number through 9,999 by a 1-digit divisor and check using multiplication**

**STRATEGY 1:** Adapt Strategy 1, P.O. 4.05.03.01 (p.30S.1), for use with division examples requiring regrouping of thousands as hundreds and hundreds as tens. Squared material representing thousands may be made by placing rubber bands around groups of 10 hundreds.

**STRATEGY 2:** Adapt Strategy 2, P.O. 4.05.03.01 (p.30S.3), for use with 4-digit dividends.

4.05.06.02 **solve word problems related to skills learned in this module**

**STRATEGY 1:** Prepare and display a word problem.

e.g.,

> In 1986 a dairy farm in Wisconsin produced 1,678 pounds of cheese. If the cheese is wrapped in packages weighing 2 pounds each, how many packages can be made?

Ask a student to read the problem aloud. Say, "What information is given in this problem? (1,678 pounds of cheese were produced and were then wrapped in packages of 2 pounds each.) What must we find? (We must find how many packages of cheese can be made.) How can we solve this problem? (We can divide 1,678 by 2.) Why is dividing a good way to solve this problem? (When we want to separate an amount into smaller, equal groups, we divide.) Before we solve this problem, let's estimate the number of 2 pound packages that can be made. How shall we do that?" (Since we cannot divide the 1 in the thousands place into equal groups of 2, we will exchange the 1 thousand for 10 hundreds and divide all 16 hundreds

**STRATEGY 1:** cont'd

into equal groups of 2. 16 hundreds divided into equal groups of 2 equals 800.) On the chalkboard write: estimate = 800. Ask the students to solve the problem in their notebooks as one student solves the problem on the chalkboard.

Say, "What is the quotient? (The quotient is 839.) Is this quotient reasonable? Explain. (The quotient, 839, is close to our estimate of 800. Therefore, it is reasonable.) How can we check the quotient?" (We can multiply the quotient by the divisor. The result should be the dividend.) Ask the students to check their work as one student checks at the chalkboard.

e.g.,

$$\begin{array}{r} 839 \\ 2\overline{)1{,}678} \end{array}$$

check

$$\begin{array}{r} 839 \\ \underline{\times \quad 2} \\ 1{,}678 \end{array}$$

Say, "What is the answer to the problem?" (839 packages of cheese can be made.)

Repeat this procedure using other word problems.

P.O. 4.05.06.01-.02

NAME: ______________________ CLASS: __________ DATE: ________

Solve and check.

① $3\overline{)6,909}$ check

② $5\overline{)1,585}$ check

③ $2\overline{)2,755}$ check

④ $7\overline{)2,319}$ check

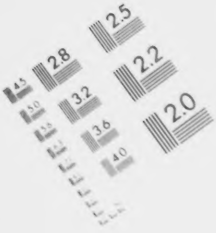
⑤ Mr. Farber's hobby is stamp collecting. During the last 3 years, he collected 1,854 stamps. There are 9 stamps on each page in his album. How many pages are in his album?

solve check

⑥ A farm in Kansas harvested 4,297 ears of corn. If 7 ears of corn are packed to a carton, how many cartons are needed?

solve check

4



2.5
2.8
2.2
4.5
5.0
3.2
2.0
5.6
3.6
4.0

4.5
5.0
2.8
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2.5
3.6
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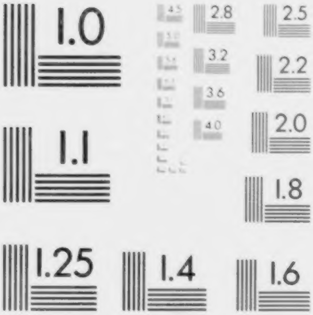
4.0
2.0

PG

100 mm



1.0
4.5
2.8
2.5
5.0
3.2
2.2
5.6
3.6
4.0
2.0
1.1
1.8
1.25
1.4
1.6

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890

ABCDEFGHIJKLMNOPQRSTUVWXYZ
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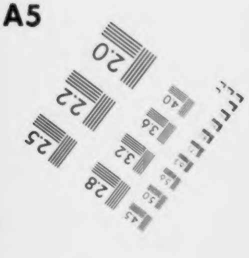
1234567890

1.0 mm

1.5 mm

2.0 mm

A5



2.0
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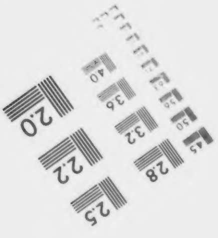
5.0
4.5



4.0
2.0
3.6
5.6
3.2
5.0
4.5
2.2
2.8
2.5

Unit 54

## 4.10.06 MEASUREMENT - TEMPERATURE

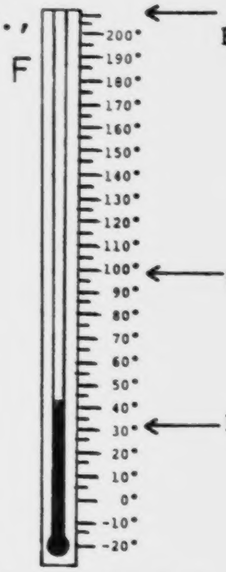
(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

*4.10.06.01A read and locate the degrees for the freezing point of water (32°F), the boiling point of water (212°F), and normal body temperature (98.6°F) on a **Fahrenheit** thermometer;

e.g.,


F
200°
190°
180°
170°
160°
150°
140°
130°
120°
110°
100°
90°
80°
70°
60°
50°
40°
30°
20°
10°
0°
-10°
-20°

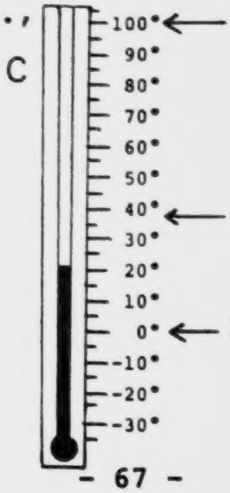
Boiling point of water 212°F

Normal body temperature 98.6°F

Freezing point of water 32°F

*4.10.06.02A read and locate the degrees for the freezing point of water (0°C), the boiling point of water (100°C), and normal body temperature (37°C) on a **Celsius** thermometer.

e.g.,


C
100°
90°
80°
70°
60°
50°
40°
30°
20°
10°
0°
-10°
-20°
-30°

Boiling point of water 100°C

Normal body temperature 37°C

Freezing point of water 0°C

**4.10.06**

## VOCABULARY

| TERMS | SYMBOLS |
|---|---|
| Fahrenheit | F° |
| Celsius | C° |
| mercury | |
| degree | |
| freezing point | |
| boiling point | |
| body temperature | |

## GETTING STARTED 1:

Prepare and display a pan of ice water, a pan of warm water, and a thermometer. Ask a student to read the temperature on the thermometer and then to place the thermometer in the pan of ice water. Say, "What happened to the column of liquid in the thermometer? (The column of liquid went down.) We call this liquid mercury. Why did the mercury go down when the thermometer was placed in the pan of ice water?" (The mercury went down because the ice water was colder than the room temperature.) Ask another student to place the thermometer in the pan of warm water. Say, "What happened to the mercury in the thermometer?" (The mercury went up.) Why did the mercury go up when the thermometer was placed in warm water? (The mercury went up because the water in this pan is warmer than the water in the first pan.) What did we notice about the mercury in the thermometer with each experiment?" (The mercury went up in the warm water and it went down in the cold water.)

## GETTING STARTED 2:

Prepare two ribbon thermometers, Fahrenheit and Celsius, and a set of temperature cards.

e.g., 25°C -5°F 75°F -10°C

Ask the students to identify both thermometers. Say, "What does a thermometer measure? (It measures temperature.) How are the degrees

## GETTING STARTED 2: cont'd

numbered on each thermometer? (Accept responses according to the thermometers used, e.g., The numbering is by tens. ... by fives. ... by twos.)

Ask a student to select a temperature card, read it silently, and display that temperature on the appropriate ribbon thermometer. Ask another student to read the temperature displayed. The first student may then display his/her temperature card so the other students may verify that the temperature on the card and the temperature shown on the thermometer are the same.

Repeat this procedure using other temperature cards until each student has had a chance to participate.

**4.10.06**

**4.10.06.01** **read and locate the degrees for the freezing point of water (32°F), the boiling point of water (212°F), and normal body temperature (98.6°F) on a Fahrenheit thermometer**

**STRATEGY 1:** Prepare and display a large Fahrenheit ribbon thermometer or a chart illustrating the Fahrenheit scale. Also prepare 3 index cards labeled in the following way:

| | | |
|---|---|---|
| freezing point<br>of water<br>______ | boiling point<br>of water<br>______ | normal body<br>temperature<br>______ |

Say, "What is the liquid inside a real thermometer called? (The liquid is called mercury.) What does the mercury inside a thermometer show? (The mercury shows the degrees of temperature.) What represents the mercury on the ribbon thermometer?" (The ribbon represents the mercury.) Ask a student to move the ribbon on the thermometer to show 32°F. Say, "Between which temperature markings on the thermometer is 32° located? (32 degrees is between 30° and 35°.) Say, "When the temperature is 32°F, water will freeze and become ice. We say that 32°F is the freezing point of water." Ask a student to select the appropriate index card and tape it near 32° on the ribbon thermometer. Say, "What temperature should we write on the line on this card?" (We should write 32°F because that is the temperature on the Fahrenheit scale at which water freezes.) On the chalkboard write: Water freezes at 32°F. Ask the students to write this in their notebooks.

**STRATEGY 1:** cont'd

Repeat this procedure to locate and label the temperature of the boiling point of water and the temperature of normal body temperature on the Fahrenheit scale.

**4.10.06.02** **read and locate the degrees for the freezing point of water (0°C), boiling point of water (100°C) and normal body temperature (37°C) on a Celsius thermometer**

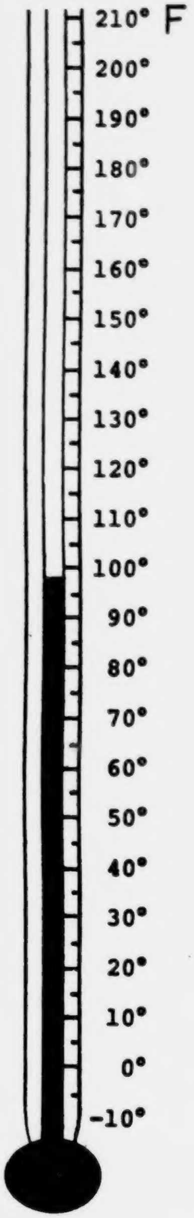
**STRATEGY 1:** Adapt Strategy 1, P.O. 4.10.06.01, using a Celsius ribbon thermometer or a chart illustrating the Celsius scale.

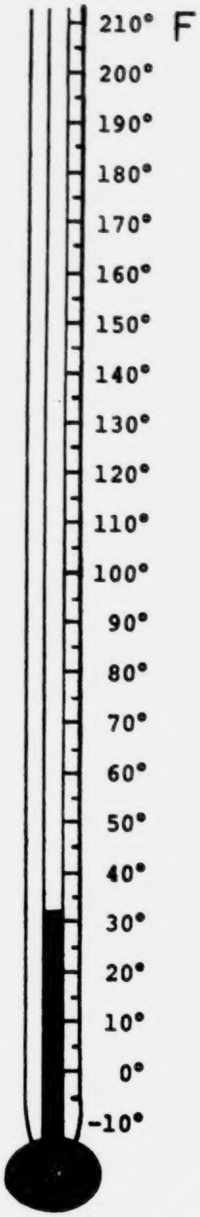
P.O. 4.10.06.01

NAME: ____________________ CLASS: __________ DATE: __________

Follow the directions below.

1. Place an X under the thermometer that shows the freezing point of water.
2. Place a △ under the thermometer that shows the boiling point of water.
3. Place a ☐ under the thermometer that shows normal body temperature.


210° F
200°
190°
180°
170°
160°
150°
140°
130°
120°
110°
100°
90°
80°
70°
60°
50°
40°
30°
20°
10°
0°
-10°


210° F
200°
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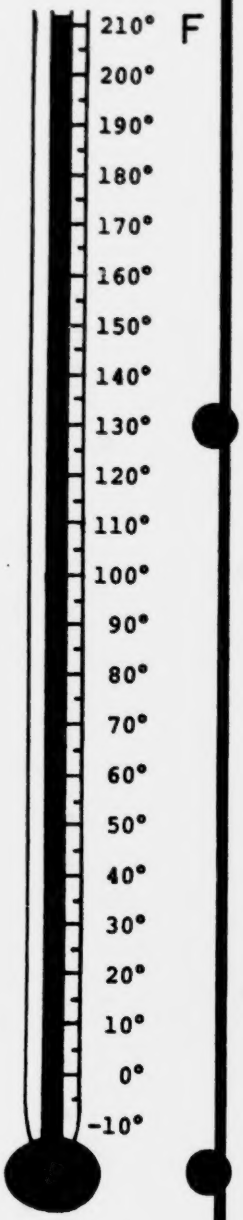
30°
20°
10°
0°
-10°


210° F
200°
190°
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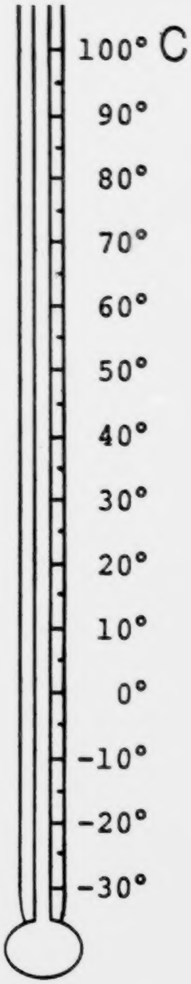
140°
130°
120°
110°
100°
90°
80°
70°
60°
50°
40°
30°
20°
10°
0°
-10°

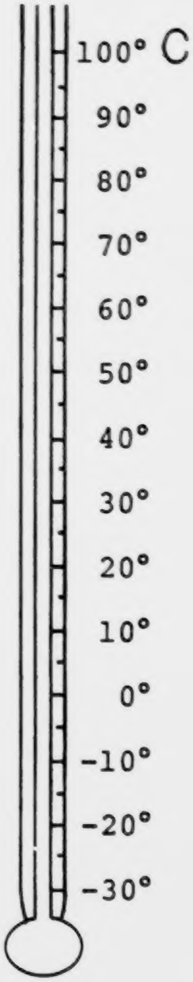
P.O. 4.10.06.02

NAME: ______ CLASS: ______ DATE: ______

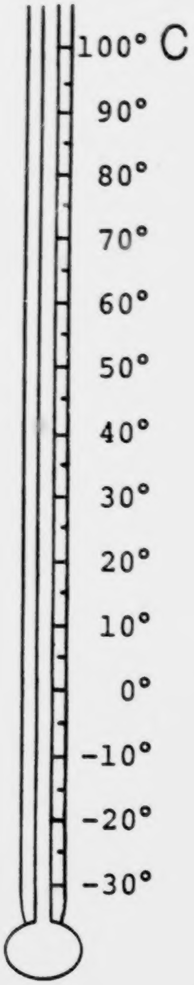
Shade each Celsius thermometer below to show the correct temperature.


100° C
90°
80°
70°
60°
50°
40°
30°
20°
10°
0°
-10°
-20°
-30°

Normal Body Temperature


100° C
90°
80°
70°
60°
50°
40°
30°
20°
10°
0°
-10°
-20°
-30°

Boiling Point of Water


100° C
90°
80°
70°
60°
50°
40°
30°
20°
10°
0°
-10°
-20°
-30°

Freezing Point of Water

## CHALLENGE!

Draw a line to connect each temperature with the correct phrase.

| | |
|---|---|
| 27°C | a very cold day |
| -8°C | a very hot day |
| 35°C | a warm day |

## 4.08.01 INTEGERS

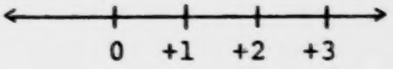
(2 lessons)

**PERFORMANCE OBJECTIVES**

The student will be able to...

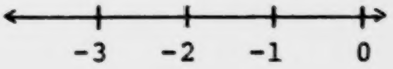
4.08.01.01A identify a positive number as a number which appears to the right of zero on a number line;

e.g.,



4.08.01.02A identify a negative number as a number which appears to the left of zero on a number line;

e.g.,



*4.08.01.03A identify situations when negative and positive numbers may be used;

e.g.,

- money saved (positive numbers)
- money spent (negative numbers)
- temperature above and below zero on a thermometer

4.08.01.04A solve word problems related to skills learned in this module.

e.g.,

The temperature was 5° above zero but went up 3°. What is the temperature now?

## VOCABULARY

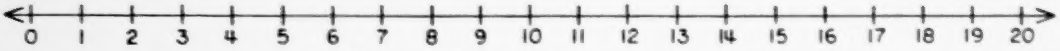
| TERMS | SYMBOLS |
|---|---|
| positive number | + |
| negative number | - |
| integer | |

---

## GETTING STARTED 1:

Prepare and display a number line.

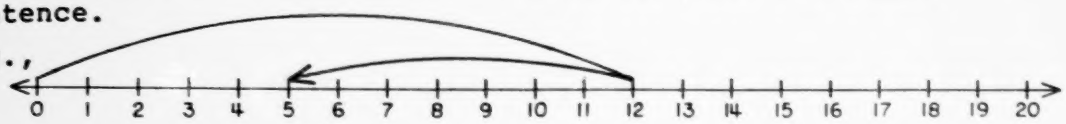
e.g.,



Say, "What can we say about the value of numbers as we move to the right on the number line? ... left on the number line?" (As we move to the right on the number line, the value of the numbers becomes greater. As we move left, the values become less.)

On the chalkboard write: 12 - 7 =☐. Ask a student to show this subtraction on the number line and to complete the number sentence.

e.g.,



12 - 7 = 5

Repeat this procedure using other addition and subtraction number sentences.

e.g.,

11 + 9 = ☐

20 - 12 = ☐

17 - 4 = ☐

9 + 8 = ☐

---

## GETTING STARTED 2:

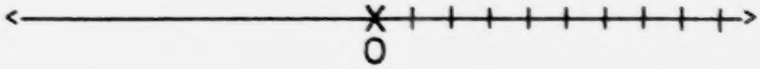
Prepare and display a Celsius ribbon thermometer. Place the ribbon at 15°C. Ask a student to read the temperature aloud. Say, "How can we show that the temperature got colder?" (We can move the ribbon down on the thermometer.) Ask a student to indicate a temperature colder than 15°C and read it aloud. Repeat this procedure, asking the students to read temperatures above and below zero on the thermometer, e.g., 10° above zero, 4° below zero, ...

**4.08.01**

**4.08.01.01** **identify a positive number as a number which appears to the right of zero on the number line**

**STRATEGY 1:** Draw a line on the chalkboard. Place an X in the center and mark the line at equal intervals to the right of the X only. Label the X, 0.

e.g.,



Ask a student to place his/her finger on the X and then move along the line to the second mark. Say, "What number will we call this mark?" (We will call it 2 because it is 2 marks away from the X.) Write the number 2 below the mark. Say, "Now move 4 more marks away from 2. What number shall we call this mark?" (This is number 6.) Label the number 6 mark. Say, "Now move back 3 marks. What number will this mark represent?" (This is the number 3.) Repeat this procedure until all the marks are labeled.

Say, "What kind of line is this? (It is a number line.) Look at the numbers on the number line. How do they compare to zero? (They are all greater than 0.) We call these numbers positive numbers." Write on the chalkboard and say, "The numbers to the right of 0 on the number line are greater than 0 and are called positive numbers." Ask the students to write this in their notebooks. Say, "We can write positive numbers two ways. We can write positive numbers with a small plus symbol to their left. A number with no symbol in front of it is known to be a positive number." Write the number positive 2 on the chalkboard two ways, with the plus symbol and without the plus symbol. Say, "Both twos mean the 2 to the right of the 0. The two with the plus symbol is read as positive two. Ask the students to write the numbers +1 through +10 in their notebooks. Say, "Where do we find positive numbers on a number line? (They are to the right of 0.) How do we show that

**STRATEGY 1:** cont'd

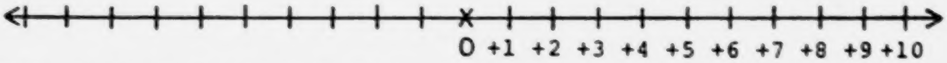
they are postive? (We can put a little plus symbol to the left of the number or we can write the number with no symbol at all.) Are positive numbers greater than or less than 0? (They are greater than 0.) How do you know?" (Positive numbers are to the right of 0 on the number line. As we move to the right on a number line the numbers become greater in value.)

**4.08.01.02** **identify a negative number as a number which appears to the left of zero on a number line**

**STRATEGY 1:**

Using the number line prepared in Strategy 1, P.O. 4.08.01.01, say, "What number does the X represent?" (The X represents zero.) Ask the students to name the numbers represented by the marks to the right of zero.

e.g.,



Say, "What does the plus symbol next to each number mean? (It means they are positive numbers.) What do we know about positive numbers? (Positive numbers are greater than zero.) What happens to our numbers as we move further and further to the right?" (The numbers get larger.) Draw the marks on the number line to the left of zero. Say, "What happens as we move left on the number line?" (The numbers get smaller.) Ask a student to place his/her finger on the X and then to move one mark to the left. Say, "In what direction did you move? (I moved to the left of 0.) Counting from zero, how many spaces did you move? (I moved one space.) What number will we call this mark? (We will call this mark 1 because it is one away from zero.) Why might this be confusing? (We already have a mark labeled 1 to the right of zero.) What symbol did we use to indicate the 1 to the right of zero? (We used a plus symbol.) To indicate 1 to the left of zero, we will write a minus symbol to the left of this 1."

**STRATEGY 1:** cont'd

e.g.,

<————————————————————————>

Say, "We read this as negative 1. How does negative 1 compare to zero? (It must be less than zero.) How do you know?" (As we move left on the number line, the numbers get smaller.) Ask the students to name the remaining marks to the left of zero.

e.g.

<————————————————————————>

Write the number -4 on the chalkboard. Say, "How do we read this number?" (We say negative 4.)

Say, "I will say a positive or negative number. Write it in your notebooks using the correct symbol." Ask one student to indicate each number on the number line as another student writes the number on the chalkboard. Repeat this procedure until each student has had a chance to participate.

Say, "Where are the negative numbers on a number line? (They are to the left of zero.) Are they greater than or less than zero? (They are less.) What happens as you go further to the left? (The value of the numbers get smaller.) Which is less in value, -2 or -8? (-8 is less.) How do you know?" (-8 is further to the left of zero than -2 is.)

**4.08.01.03** **identify situations when positive and negative numbers may be used**

**STRATEGY 1:** Prepare and display a Celsius thermometer. Say, "When we measure things like temperature we need a base from which to start counting. We call that base zero. Sometimes, the temperature outside gets colder than zero. We can't keep changing our base, so we use negative numbers to indicate temperatures below zero. The thermometer is like a number line that is standing up." Ask the students to read several

**STRATEGY 1:** cont'd

temperatures above and below zero and to describe what type of clothing they might wear at each temperature and what activities they might be doing.

Say, "There are other uses for positive and negative numbers. An integer is another name for a positive or negative number. Zero is also an integer, even though it is neither positive nor negative. How can we use negative numbers to show how much money we owe someone?" (If I owe $15, I can think of that amount as negative 15.)

Say, "We can also use positive and negative numbers, or integers, to tell how far above or below sea level a place is."

e.g.,

+100 ft. means 100 ft. above sea level.
-80 ft. means 80 ft. below sea level.

Repeat this procedure using other examples.

**4.08.01.04** **solve word problems related to skills learned in this module**

**STRATEGY 1:** Prepare and display the following chart:

**Average Monthly Temperature**
**in Juneau, Alaska**

| | | | |
|---|---|---|---|
| Jan. | -5°C | July | +13°C |
| Feb. | -2°C | Aug. | +12°C |
| Mar. | 0°C | Sept. | +10°C |
| Apr. | +4°C | Oct. | +6°C |
| May | +8°C | Nov. | 0°C |
| June | +12°C | Dec. | -3°C |

Say, "Juneau is the capital city of Alaska. What data does this chart show us? (The chart shows us the average temperature each month in Juneau.) What

**STRATEGY 1:** cont'd

scale of temperature was used? (The Celsius scale was used.) What do we know about 0° on the Celsius scale?" (It is the temperature at which water freezes.)

Say, "Look at the chart. What do you notice about the kinds of numbers you see? (Some numbers are positive and some are negative. Zero doesn't have any symbol next to it.) What do we call positive and negative numbers? (They, together with zero, are called integers.) Zero is neither positive nor negative."

Say, "In Juneau, which month has the highest average temperature? (July has the highest average temperature, 13° above 0.) How is 13° above 0 written on the chart? (It is written as positive 13.) Do we need the symbol for a positive number? (No. If there is no symbol, the number is positive.) Which month is the coldest in Juneau? (January is the coldest month with an average temperature of 5° below 0.) Why is -5° colder than -3°?" (It is colder because it is further below 0.)

Repeat this procedure, asking the students to answer other questions related to the chart.
e.g.,

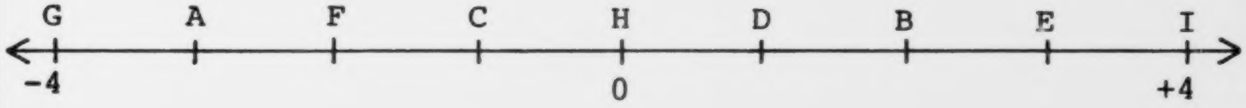
- How much warmer is it in September than November?
- How much colder is it in January than March?
- In which month is the average temperature 2° warmer than that of October?
- Which month has an average temperature 2° colder than that of March?
- How many degrees colder is it in December than in September?

P.O. 4.08.01.01-.02

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

Complete the number line.



Write the value for each letter.

A = ________

B = ________

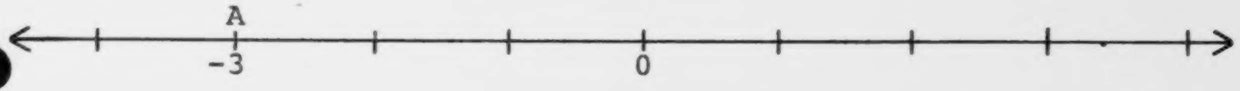
C = ________

D = ________

E = ________

F = ________

Write each letter above the number line according to the directions.



A = -3

S = +4

V = -1

E = 0

U = +3

M = -4

L = +1

R = -2

0 = +2

What word do the letters spell?

________________________

Write the signed numbers below.

4 greater than zero = ____

38 greater than zero = ____

12 less than zero = ____

62 greater than zero = ____

106 to the right of zero = ____

3 to the left of zero = ____

15 to the right of zero = ____

1 less than zero = ____

87 to the left of zero = ____

32 greater than zero = ____

P.O. 4.08.01.03-.04

NAME:______________________ CLASS:__________ DATE:________

Follow the directions below.

I. Place a + on the line next to the sentences that represent positive numbers and a — on the line next to the sentences that represent negative numbers.

a. _+_ The temperature is 10° above 0.

b. ___ The football team gained 12 yards.

c. ___ Joe gained 7 pounds.

d. ___ I spent $36.00.

e. ___ We live 200 feet above sea level.

f. ___ The temperature is 5° below 0.

g. ___ Teddy lost 3 pounds.

h. ___ The lake is 100 feet below sea level.

II. Solve each problem below.

a. The temperature was 15°C. It got 10° warmer. What was the temperature then?

__________

b. On a cold day, the temperature was -5°C. During the night the temperature dropped 7°. What was the temperature then?

__________

**CHALLENGE!** How many jumps on the number line must we make to get from -6 to +7?

Hint: Draw a number line. __________ jumps

# SHARPENING YOUR SKILLS

**Units 53, 54, 55**

**Name** ______________________ **Class:** ___________ **Date:** ___________

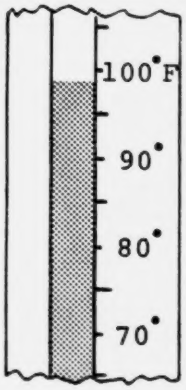
1. $3\overline{)6,936}$ check

2. A fruit drink company places 6 drinks in each pack. How many packs are needed for 8,496 drinks?

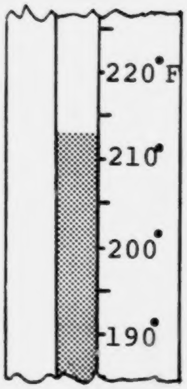
ⓐ 1,016 ⓒ 1,616

ⓑ 1,416 ⓓ Not Here

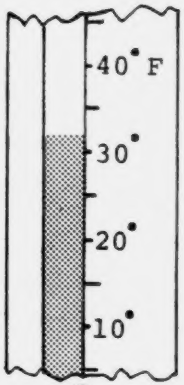
Use the Fahrenheit thermometers below to answer questions 3 - 5.



A



B



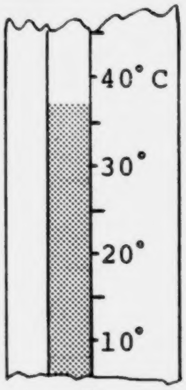
C

3. Which thermometer shows the temperature at which water freezes? _______

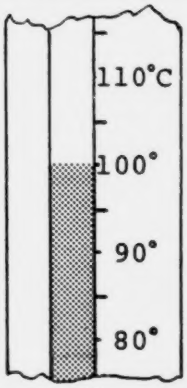
4. Which thermometer shows the temperature at which water boils? _______

5. Which thermometer shows normal body temperature? _______

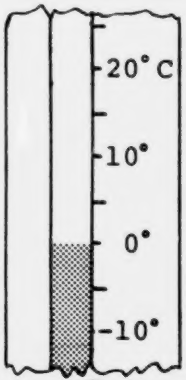
Use the Celsius thermometers below to answer questions 6 - 8.



D



E



F

6. Which thermometer shows the temperature at which water freezes? ______

7. Which thermometer shows normal body temperature? _____

8. Which thermometer shows the temperature at which water boils? _____

9. Which sentence below is true?

ⓔ Negative numbers are greater than 0.

ⓕ Positive numbers are less than 0.

ⓖ -2 is greater than -4.

ⓗ Not Here

10. The daytime temperature on the Celsius thermometer was at 0. At night, it became 2 colder. What was the temperature then?

ⓐ 0° C ⓒ 2° C

ⓑ -2° C ⓓ Not Here

## 4.12.04 ARRANGEMENTS

(1 lesson)

## PERFORMANCE OBJECTIVES

The student will be able to...

4.12.04.01A identify all the possible arrangements for a group of objects;

e.g.,

apple, banana, orange
apple, orange, banana

banana, apple, orange
banana, orange, apple

orange, apple, banana
orange, banana, apple

Therefore, there are 6 possible arrangements for a group of 3 objects.

4.12.04.02A solve word problems related to skills learned in this module.

e.g.,

How many ways can the dentist schedule appointments for James, Angela, and Mike on Saturday morning?

4.12.04

## VOCABULARY

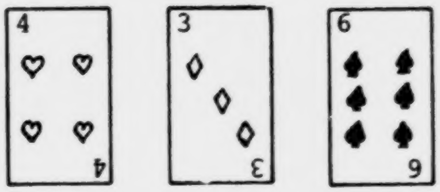
**TERMS**

arrangements
tree diagrams

---

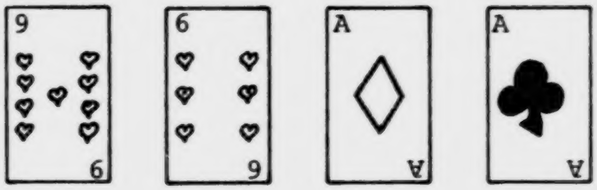
**GETTING STARTED 1:**

Prepare a deck of playing cards. Choose 3 cards and display them. e.g.,



Say, "If we were to shuffle these cards and then pick one card without looking, what is the probability of picking the four of hearts? (The probability of picking the four of hearts is 1 out of 3, or $\frac{1}{3}$.) How do you know? (There are 3 cards and only 1 of them is the four of hearts.) What would be the probability of picking a red card from these same three cards? (The probability of picking a red card is 2 out of 3, or $\frac{2}{3}$.) How do you know?" (There are three cards and two of them are red.)

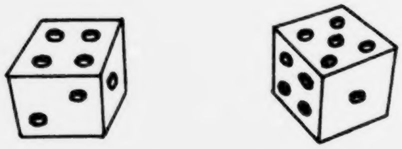
Repeat this procedure using other groups of cards from the deck. e.g.,



## GETTING STARTED 2:

Prepare and display a pair of dice. Say, "What do the dots on the dice represent?" (They represent the numbers 1, 2, 3, 4, 5, and 6.) Ask a student to roll the dice, name the numbers represented on the top face of each die, and state the sum.

e.g.,

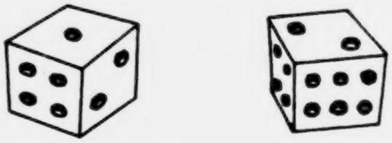


"4 plus 5 equals 9."

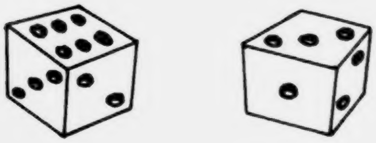
Say, "How else could we get a sum of 9 on the dice? (We could have rolled 5 and 4, 6 and 3, or 3 and 6.) How is rolling 4 and 5 different from rolling 5 and 4? (4 and 5 means rolling 4 on the first die and 5 on the second die. 5 and 4 means rolling 5 on the first die and 4 on the second die.) How are they the same?" (The sums are the same.)

Repeat this procedure, arranging the dice in various ways to make other sums.

e.g.,



"1 plus 2 equals 3."



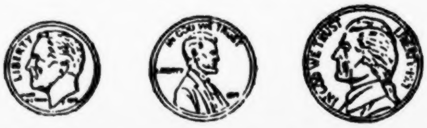
"6 plus 3 equals 9."

4.12.04

**4.12.04.01** **identify all the possible arrangements for a group of objects**

**STRATEGY 1:** Prepare and distribute play money (a penny, a nickel, and a dime) to each student or group of students. Say, "Place your coins in a row on your desk." Ask a student to tell how he/she arranged the coins.

e.g.,



"I placed the dime first, then the penny, then the nickel."

Say, "Who arranged them in a different way? (Accept all reasonable responses.) Let's find out how many ways there are to arrange our coins. Start with one coin, the penny. Place it by itself on your desk. How many ways do you think we can arrange this one coin? (There is only one way to arrange it because there is only one coin.) "Which coin can we place next to the penny? (We can place the nickel next to the penny.) If we do that, what coin must be third?" (The dime must be third.) List each arrangement on the chalkboard as it is named.

e.g.,

penny, nickel, dime

Say, "If we keep the penny first, what coin could we have placed next to it instead of the nickel? (We could have placed the dime next to the penny.) Then what coin would have to be third?" (The nickel would have to be third.) Ask the students to show this arrangement with their coins as one student writes the arrangement on the chalkboard.

Say, "If we keep the penny first, is there any other arrangement we can make? (No.) Why? (Each of the other two coins has had a turn to be in second place and third place.) How can we make a different arrangement?" (We can place the nickel or the dime in the first place.)

**STRATEGY 1:** cont'd

Ask the students to use their coins to show the possible arrangements when the nickel is placed first as one student writes them on the chalkboard.

e.g.,

nickel, penny, dime
nickel, dime, penny

Say, "How many arrangements were possible when placing the penny in first place? (2 arrangements were possible.) Why are there only two arrangements with the nickel in first place? (Once we place the nickel in first place, we can either put the penny second and the dime third, or the dime second and the penny third.) What can we do to find more arrangements? (We can place the dime first.) How many arrangements do you think we will be able to make placing the dime first." (We should be able to make two arrangements.) Ask the students to show the arrangements as one student lists them on the chalkboard.

e.g.,

dime, penny, nickel
dime, nickel, penny

Say, "We have made every arrangement using the penny first, then the nickel first, then the dime first. How many arrangements were possible using all three coins?" (6 different arrangements were possible.)

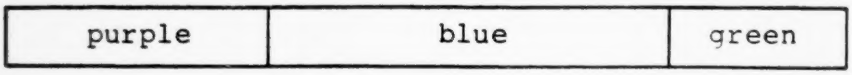
Repeat this procedure using only 2 coins to find 2 arrangements. Students may explore the arrangements that can be made using 4 coins or other objects. However, they may need assistance in finding all 24 possible arrangements of 4 coins.

**STRATEGY 2:** Prepare and distribute a blue rod, a green rod and a purple rod to each student or group of students. Say, "We will find out how many different ways we can arrange our rods. To do this, we will draw a tree

**STRATEGY 2:** cont'd

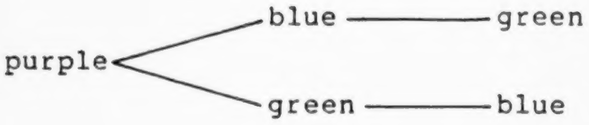
diagram. Place your rods in a row, end to end, with the purple rod first, then the blue rod, and finally the green rod."

e.g.,



Say, "How else can we arrange these rods if we keep the purple rod in first place? (We can place the blue rod second and the green rod third.) Is there any other way to arrange the rods if we keep the purple rod first? (No.) We will show these arrangements with a tree diagram." Draw the following on the chalkboard:

**Tree Diagram**

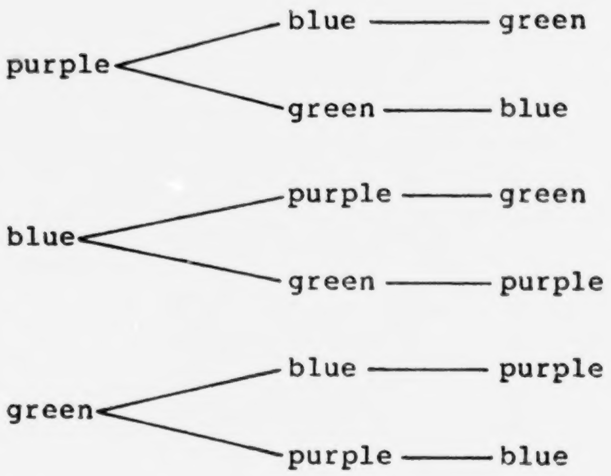


Say, "This tree diagram shows us that the purple rod was first. If we follow the top branch of the tree diagram, we see that blue was second and green was third. If we follow the bottom branch of the tree diagram, we see that after purple, green was second and blue was third. The tree diagram shows us with words and lines the arrangements that we made. Now let's see what arrangements we can make placing the blue rod first." After the students have discovered that two arrangements are possible when we place the blue rod first, continue the tree diagram at the chalkboard.

Repeat this procedure, using the green rod first and finding the possible arrangements. Complete the tree diagram.

**STRATEGY 2:** e.g.,
cont'd

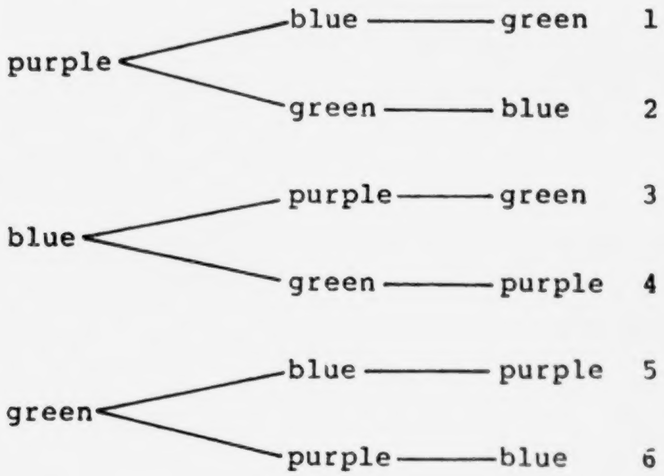
**Tree Diagram**


blue — green
purple
green — blue
purple — green
blue
green — purple
blue — purple
green
purple — blue

Say, "To find the number of arrangements we made in all, we can count the branches of the tree diagram."

e.g.,

**Tree Diagram**


blue — green 1
purple
green — blue 2
purple — green 3
blue
green — purple 4
blue — purple 5
green
purple — blue 6

Say, "Our tree diagram shows the 6 possible arrangements we made with 3 rods."

Repeat this procedure, arranging three other objects, e.g., pen, pencil, crayon.

**4.12.04**

**4.12.04.02** **solve word problems related to skills learned in this module**

**STRATEGY 1:** Prepare and display a word problem.

e.g.,

> Mrs. Brown asked Jane, Tony, and Bonnie to come to the front of the room. Show all the different ways these students can line up in the front of the room.

Say, "What information is given in this problem? (We know that three students are lining up in the front of the classroom.) What must we find? (We must find all the different ways they can line up.) How can we solve this problem?" Record the responses on the chalkboard.

e.g.,

- We can list the different arrangements.
- We can draw a tree diagram.

Ask the students to solve the problem using one of the strategies listed. After the students have solved the problem, say, "How many ways can the students line up?" (They can line up in 6 different ways.) Ask several students to demonstrate their method of solving the problem.

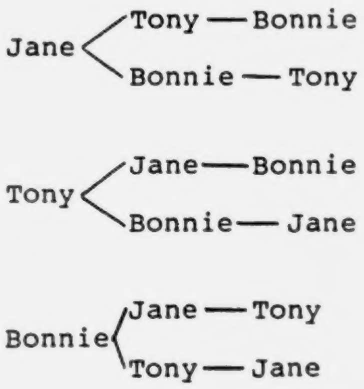
**List**

Jane, Tony, Bonnie
Jane, Bonnie, Tony

Tony, Jane, Bonnie
Tony, Bonnie, Jane

Bonnie, Jane, Tony
Bonnie, Tony, Jane

**Tree Diagram**



P.O. 4.12.04.01

NAME: ____________________ CLASS: __________ DATE: ________

Follow the directions below.

A. Show all the possible arrangements for the groups below.

| | |
|---|---|
| 1. red, blue | 2. A, B, C |
| 3. 3, 4, 5 | 4. dime, quarter |

B. Complete the sentences below.

1. When there are 2 items to arrange, we can show __________ different arrangements.
2. When there are 3 items to arrange, we can show __________ different arrangements.

P.O. 4.12.04.02

NAME: ______________________ CLASS: __________ DATE: ________

Solve each problem below.

1. Theo has a red pencil, a blue pencil, and a black pencil. Show all the ways Theo can arrange these pencils on his desk.

red, blue, black

2. Show all the different numbers that can be made using the digits 3, 4, and 9.

3. Jerry picked three playing cards, a jack, a queen, and a king. Show all the different ways Jerry can arrange these cards.

## CHALLENGE!

Find all the different ways the following four numbers can be arranged.

4, 3, 2, 1

How many arrangements did you find? ____________

Unit 57

## 4.13.04 PROBLEM SOLVING - PATTERNS

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

*4.13.04.01A locate patterns on a calendar;

e.g.,

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |

Can you locate a vertical pattern?

Can you locate a diagonal pattern?

Can you locate other patterns?

*4.13.04.02A locate patterns on a chart/table.

e.g.,

| + | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| 0 | 0 | 1 | 2 | 3 |
| 1 | 1 | 2 | 3 | 4 |
| 2 | 2 | 3 | 4 | 5 |

table A

| x | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 |
| 3 | 0 | 3 | 6 | 9 |

table B

Can you locate a vertical pattern?

Can you locate a horizontal pattern?

Can you locate a diagonal pattern?

Find the sum of the digits in the horizontal rows and look for patterns.

Find the sum of the digits in the vertical columns and look for patterns.

4.13.04

## VOCABULARY

### TERMS

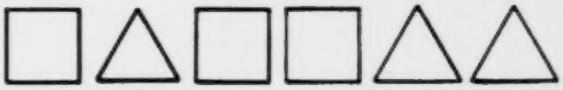
vertical
horizontal
diagonal
pattern
Multiple

---

## GETTING STARTED 1:

Prepare and distribute pattern blocks to each group of students. Draw a pattern on the chalkboard.

e.g.,



Say, "What shapes are used in this series? (Squares and triangles are used.) How can we determine what comes next? (We can look for a pattern.) Use your pattern blocks to make this pattern on your desks. See if you can find the pattern and continue it with the next three shapes."

Say, "What pattern did you find? (We began with one square and one triangle. Then the number of squares was increased by one and the number of triangles was increased by one.) What are the next 3 shapes in the pattern? (Three squares should come next.) Why?" (The pattern follows triangles with squares, so we know squares come next. There should be three squares because the pattern shows an increase of one each time a shape is repeated.) Ask a student to complete the pattern on the chalkboard.

Repeat this procedure using other patterns.

---

## GETTING STARTED 2:

Write a number sequence on the chalkboard.

e.g.,

1 ,3, 5, 7, 9, __, __, __

**GETTING STARTED 2:** cont'd

Say, "How can we find the next three numbers in this series? (We can look for a pattern in the series of numbers.) What pattern do you notice? (We add 2 to each number to get the next number.) Using that rule, what number will come after 9 in this series? (11 will come next.) ... after 11? (13 will come next.) ... after 13? (15 will come next.) Does anyone see a different pattern? (The series shows consecutive odd numbers.) Using that rule, what three numbers would you have used to complete this series? (We would still use 11, 13, and 15.) Even though we expressed the pattern in two different ways, they both completed the series the same way." Ask a student to complete the pattern at the chalkboard.

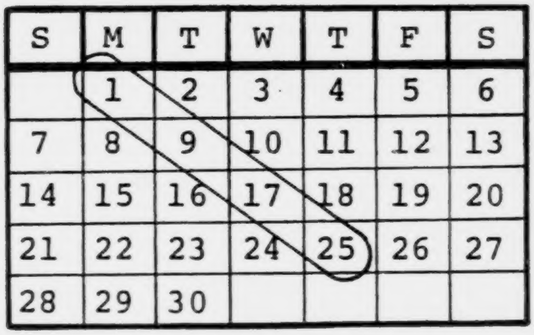
Repeat this procedure using other number series.

4.13.04

4.13.04.01 locate patterns on a calendar

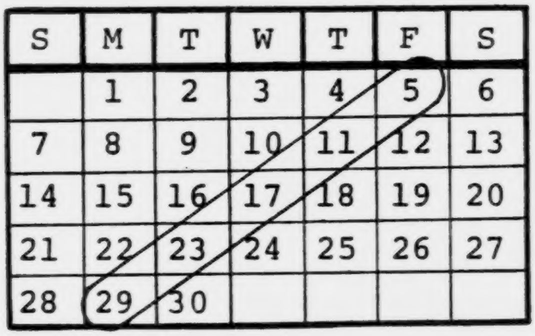
**STRATEGY 1:** Prepare and distribute copies of a calendar for the current month. (As an alternative, copies of the calendar in the Resource Material, may be completed by the students prior to this lesson.) Say, "On what day of the week did this month begin? What is that date? What will the date be one week later? What is the difference between the two dates? (The difference is 7 days.) Look at the column of dates for all the Thursdays this month. What do you notice?" (From one Thursday to the next, the difference is always 7 days.) Repeat this procedure with other dates that are one week apart.

Ask the students to look at the dates on a diagonal. e.g.,



| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 |  |  |  |  |

Say, "What pattern do you notice? (The numbers increase by eight, 1 + 8 = 9, 9 + 8 = 17 ...) Look at a diagonal in the opposite direction." e.g.,



| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 |  |  |  |  |

**STRATEGY 1:** cont'd

Say, "What pattern do you see?" (The numbers increase by six.) Ask the students to draw a box around four numbers that form a square.

e.g.,

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 |  |  |  |  |

Say, "What is the sum of the diagonals?" (They both have the same sum, 24.) Repeat this procedure with other groups of four numbers to see if the sums are equal.

Provide time for the students to explore the calendar to find other patterns.

**STRATEGY 2:** Prepare a large demonstration calendar and a 3 x 3 grid with a "window" in its center which fits over the dates of the calendar

e.g.,

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | △ | | | 12 | 13 |
| 14 | 15 | ■ | 17 | | 19 | 20 |
| 21 | 22 | ☺ | | | 26 | 27 |
| 28 | 29 | 30 |  |  |  |  |

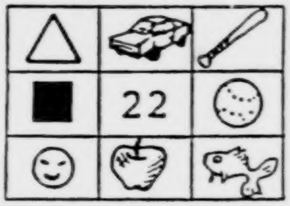
Say, "Look at the date in the window of the grid. How can that help us discover the date hidden by the square? (That date would be one less than the date in the window, it is the 16th.) What is the date

**STRATEGY 2:** cont'd

hidden by the baseball? (That date would be one more than the date in by the window. It is the 18th.) What is the date hidden by the apple?" (That date would be 7 more than the date in the window, the 24th.) Ask the students to look for other patterns using the 3 x 3 grid and the date window.
e.g.,

- The date hidden by the triangle is always 8 less than the date shown in the window.
- The date hidden by the fish is always 8 more than the date shown in the window.

Repeat this procedure by moving the 3 x 3 grid to another place on the calendar to see if the patterns we noticed are repeated.
e.g.,



**4.13.04.02** **locate patterns on a chart/table**

**STRATEGY 1:** Prepare and distribute crayons and a hundred chart to each group. (See Resource Material.) Divide the students into several groups. Say, "Today we will explore and discover patterns on a hundred chart." Ask a student in each group to use a yellow crayon to color the odd numbers on the hundred chart. Ask another student in each group to use an orange crayon to color the even numbers on another hundred chart. Say, "What patterns did you discover?" Accept reasonable responses.
e.g.,

- We shaded every other column.
- In any one column, the ones digit is the same in each number.

**STRATEGY 1:**
cont'd

- As we look down any one column, the tens digit increases by one ten in each number.

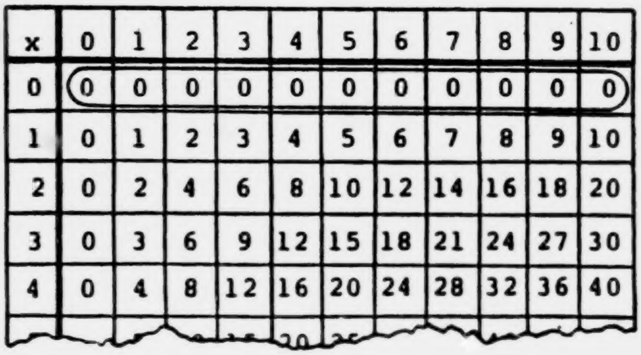
Say, "Let's explore the multiples of various numbers." Ask one group to place an X on each multiple of three. Ask another group to place an X on each multiple of four... Say, "What pattern did you discover?" (I saw a diagonal pattern.)

Repeat this procedure with other multiples of numbers to discover patterns on the hundred chart. Display the patterns of the multiples of various numbers.

Continue to explore and discover other patterns.

**STRATEGY 2:** Prepare and distribute a multiplication chart to each student and display a model of the chart at the chalkboard. Say, "Today we are going to explore the multiplication table for patterns." Ask a student to come to the chalkboard and draw a loop around a pattern on the multiplication table.

e.g.,



| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
| 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 |
| 4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 |

Say, "What pattern is formed? (A pattern of zeros is formed.) Where else does this pattern appear? (It appears in a vertical column.) Why?" (When 0 is a factor, either in the horizontal row or the vertical column, the product is always 0.) Ask the students

**STRATEGY 2:**
**cont'd**

to draw a loop around the pattern in both the row and the column.

Ask another student to loop another pattern on the multiplication table. Say, "Which pattern do you see? (I see the products when 5 is a factor.) Which pattern will you loop, the products in a row or the products in a column?" (I will loop both.) Ask the students at their seats to draw a loop around each pattern showing the products when 5 is a factor. e.g.,

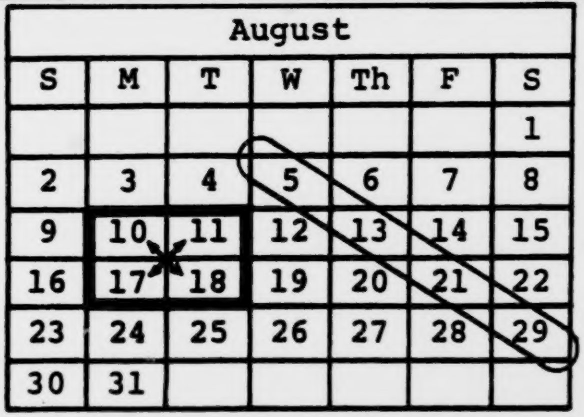
| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
| 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 |
| 4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 |
| 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 |
| 7 | 0 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 |
| 8 | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 |
| 9 | 0 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90 |
| 10 | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

Repeat this procedure discovering and drawing loops around other vertical and horizontal patterns on the multiplication table.

P.O. 4.13.04.01

NAME: ______________________ CLASS: __________ DATE: ________

Use the calendar below to answer the questions.



| August | | | | | | |
|---|---|---|---|---|---|---|
| S | M | T | W | Th | F | S |
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 30 | 31 | | | | | |

1. List the dates for all the Sundays this month.

   ______________________________

   What pattern do you notice?

   ______________________________

2. Look at the four numbers in the box. If you add each pair of numbers diagonally, what do you notice about the sums?

   ______________________________

3. Look at the numbers in the loop. What pattern do you notice?

   ______________________________

4. Complete the following patterns using the calendar.

   a. 2, 10, 18, ________

   b. 3, 10, 17, ________, ________

   c. 1, 7, 13, ________, ________, ________

   d. 30, 24, ________, ________, ________

## CHALLENGE!

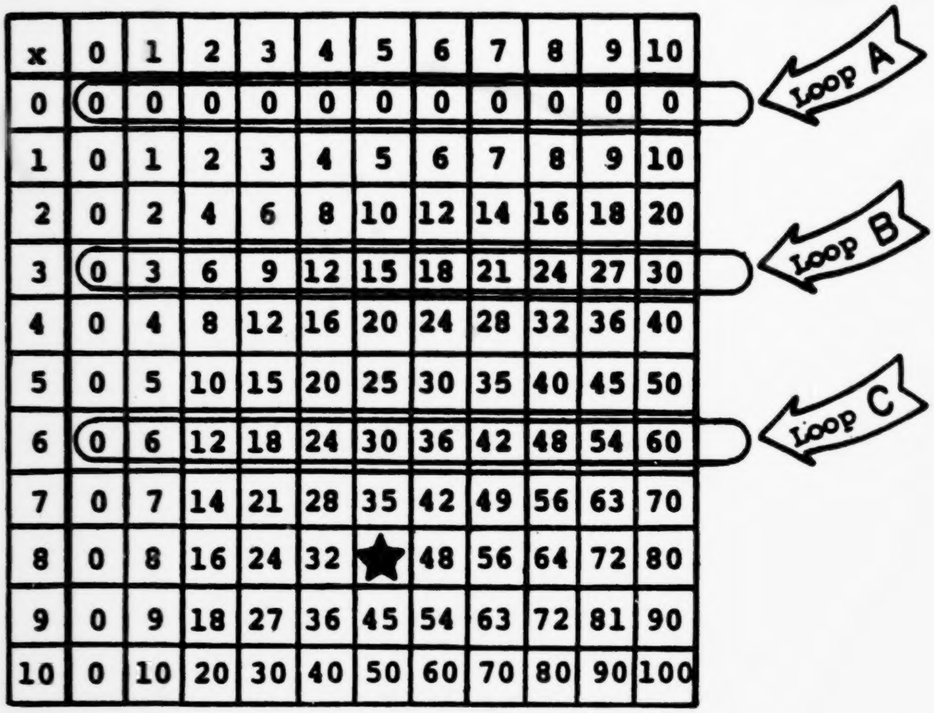
What is the sum of all the dates on the calendar above?

________

P.O. 4.13.04.02

NAME:______________________ CLASS:__________ DATE:________

Color Loop A yellow, Loop B orange, and Loop C green. Then follow the directions below.



| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
| 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 |
| 4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 |
| 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 |
| 7 | 0 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 |
| 8 | 0 | 8 | 16 | 24 | 32 | ★ | 48 | 56 | 64 | 72 | 80 |
| 9 | 0 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90 |
| 10 | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

A. Look at the pattern in Loop A. Find the same pattern in a vertical column. Draw a loop around that pattern and color it yellow.

B. Look at the pattern in Loop B. Find the same pattern in a vertical column. Draw a loop around that pattern and color it orange.

C. Look at the pattern in Loop C. Find the same pattern in a vertical column. Draw a loop around that pattern and color it green.

D. Complete this pattern 0,8,16,__,__,__,__,__,__,__,__.

E. Use a pattern to discover the product hidden by the ★.
★ = ________________.
What pattern did you use? ______________________________.

F. Write a pattern of numbers which are on a diagonal.
__________________________________________________.

## 4.06.07 COMMON FACTORS

(2-3 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.06.07.01B find the common factors of two or more whole numbers less than 100;

e.g., 18 and 24
The factors of 18 are 1,2,3,6,9,18.
The factors of 24 are 1,2,3,4,6,8,12,24.
The common factors of 18 and 24 are 1,2,3,6.

4.06.07.02B find the greatest common factor of a set of whole numbers;

e.g., 12, 18, 24
The factors of 12 are 1,2,3,4,6,12.
The factors of 18 are 1,2,3,6,9,18.
The factors of 24 are 1,2,3,4,6,8,12,24.
The greatest common factor of 12,18, and 24 is 6.

4.06.07.03B find the common multiples of two or more whole numbers less than 100;

e.g., 2 and 3
The multiples of 2 are 2,4,6,8,10,12...
The multiples of 3 are 3,6,9,12,15,18,...
The common multiples of 2 and 3 are 6 and 12...

4.06.07.04B find the least common multiple of a set of whole numbers.

e.g., 2, 3, 4
The multiples of 2 are 2,4,6,8,10,12...
The multiples of 3 are 3,6,9,12,15,18,...
The multiples of 4 are 4,8,12,16,20,24,...
The least common multiple of 2,3, and 4 is 12.

**4.06.07**

## VOCABULARY

### TERMS

factors
multiples
common factors
common multiples
greatest common factor (GCF)
least common multiple (LCM)

---

### GETTING STARTED 1:

Prepare and distribute a supply of discs and a multiplication chart to each student or group of students. Say, "What are factors? (Factors are numbers which we multiply together to get a product.) We can use the multiplication chart and the discs to find the factors of numbers. Find 6 as a product on the chart. Follow that column all the way to the top. Place a disc on the number you find there. Follow the row all the way to the left. Place a disc on the number you find there. e.g.,

| x | 0 | 1 | 2 | ● | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| ● | 0 | 2 | 4 | **6** | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
| 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 |
| 4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 |
| 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 |

What numbers did you cover? (I covered 2 and 3.) 2 and 3 are factors of 6. Did anyone cover other numbers? (I covered 6 and 1.) Why are 6 and 1 also factors of 6?" (They are factors of 6 because 6 times 1 equals 6.) On the chalkboard write: The factors of 6 are 1,2,3,6.

Repeat this procedure with other sets of numbers.

## GETTING STARTED 2:

Divide the students into two teams to play Name Those Factors. Ask one student to be the recorder and another student to be the scorekeeper. Say, "To play Name Those Factors, the members of Team A must state a number. Team B will work together to name all the factors of that number. The recorder will list on the chalkboard all the factors that Team B names. Team B will receive a point for each correct factor. Then Team B will have a chance to state a number for Team A to factor. The scorekeeper will keep the score for both teams." Play the game until one team has 20 points.

**Note:** Some students may discover that stating a prime number for the opposing team to factor will keep the opposing team from gaining more than 2 points each time because a prime number has only 2 factors.

**4.06.07**

**4.06.07.01** find the common factors of two or more whole numbers less than 100

**STRATEGY 1:** Prepare and distribute several red discs, blue discs, and a multiplication chart through 10 x 10 to each student or group of students. Say, "We have used the chart and the discs to find the factors of a number. Now we will use them to find the common factors of two or more numbers." Write on the chalkboard and say, "If two numbers have the same factor, we say that factor is common to both numbers; it is a common factor."

Say, "Find the number 6 each time it appears as a product on the chart. For each 6, follow the row all the way to the left and place a blue marker on each factor. Then follow the column all the way to the top and place another blue marker on the top row factors. What factors did you find?" (We found 1,2,3, and 6 as the factors of 6.) Write the factors of 6 on the chalkboard and ask the students to write them in their notebooks.

e.g.,

The factors of 6 are 1,2,3,6.

Repeat this procedure using the red discs to find the factors of 9. List the factors of 9 on the chalkboard and ask the students to write them in their notebooks.

e.g.,

The factors of 9 are 1,3,9.

Say, "Which factors have both a blue disc and a red disc on them? (1 and 3 have both a blue disc and a red disc.) Therefore, 1 and 3 are the common factors of 6 and 9. They are the factors that 6 and 9 have in common." Circle the common factors on the chalkboard and write: The common factors of 6 and 9 are 1 and 3. Ask the students to write this in their notebooks.

**STRATEGY 1:** cont'd Repeat this procedure to find the common factors of other pairs or groups of numbers.

**STRATEGY 2:** Prepare and display number cards for the following products:

|  |  |  |  |  |
|---|---|---|---|---|
| 5 | 6 | 9 | 12 | 15 |
| 16 | 18 | 21 | 24 | 30 |

Draw a chart on the chalkboard.

e.g.,

| Products | Factors | Common Factors |
|---|---|---|
|  |  |  |

Say, "We have found the factors of numbers. Today we will learn to find the factors that several products have in common. We call these common factors. Common factors are factors which are the same for 2 or more numbers." Ask a student to select and display two product cards on the chart.

e.g.,

| Products | Factors | Common Factors |
|---|---|---|
| 12 |  |  |
| 15 |  |  |

Say, "What numbers or factors, can we multiply together to get a product of 12? (We can multiply 1 times 12, 2 times 6 or 3 times 4 to get 12.) You have just named all the factors of 12." Ask a student to list these factors in the appropriate column on the chart.

**STRATEGY 2:** cont'd

e.g.,

| Products | Factors | Common Factors |
|---|---|---|
| $\boxed{12}$ | 1,2,3,4,6,12 | |
| $\boxed{15}$ | | |

Repeat this procedure to find and list the factors of 15. Then ask a student to circle the numbers that are factors for both 12 and 15, that is, the common factors. List the common factors in the appropriate column.

e.g.,

| Products | Factors | Common Factors |
|---|---|---|
| $\boxed{12}$ | ①,2,③,4,6,12 | 1,3 |
| $\boxed{15}$ | ①,③,5,15 | |

Repeat this procedure to find the common factors of other products.

**4.06.07.02** **find the greatest common factor of a set of whole numbers**

**STRATEGY 1:** Prepare and distribute discs and multiplication charts as in Strategy 1, P.O. 4.06.07.01.

Say, "We have used the chart and the markers to show common factors of a set of numbers. Now we will find the greatest common factor of a pair of products. How do you think we might find this number? (It is the greatest number covered by a blue and a red disc.) When we used the discs to show the factors of 6 and 9, what common factors did we find? (The common factors of 6 and 9 are 1 and 3.) Of those numbers, which is the greatest common factor? (The greatest common factor is 3.) We often abbreviate the words 'greatest common factor' with the letters GCF."

**STRATEGY 1:** cont'd

Write the following on the chalkboard:

The factors of 6 are 1,2,3,6.
The factors of 9 are 1,3,9.
The common factors of 6 and 9 are 1 and 3.
The GCF of 6 and 9 is 3.

Ask the students to write this in their notebooks. Repeat this procedure using other sets of 2 or more numbers.

**STRATEGY 2:** Prepare and display the chart created in Strategy 2, P.O. 4.06.07.01. Say, "Look at the chart. What are the common factors of 12 and 15? (The common factors of 12 and 15 are 1 and 3.) Which is greater, 1 or 3? (3 is greater.) We say that 3 is the greatest common factor of 12 and 15. Sometimes we abbreviate the words 'greatest common factor' by using the initials GCF." Add a fourth column to the chart.

e.g.,

| Products | Factors | Common Factor | GCF |
|---|---|---|---|
| $\boxed{12}$ | ①,2,③,4,6,12 | 1,3 | 3 |
| $\boxed{15}$ | ①,③,5,15 | | |

Repeat this procedure to find the greatest common factor of each pair or group of numbers on the chart.

**4.06.07.03** **find the common multiples of two or more whole numbers less than 100**

**STRATEGY 1:** Prepare and distribute sets of red and blue discs and a hundred chart (see Resource Material) to each student or group of students. Say, "We will use this chart to find the common multiples of numbers. Multiples are those numbers we say when we count by the given number. What are the multiples of 10? (The multiples of 10 are 10, 20, 30 ...) What are the multiples of 5? (The multiples of 5 are 5, 10, 15, ...) Is there a limit to the number of multiples

**STRATEGY 1:** cont'd

we can name? (No, because there is no limit to the counting numbers even through only some of the multiples are listed on our chart.) On your chart, use your blue chips to cover all the multiples of 12. What numbers have you covered?" (I have covered 12, 24, 36, 48, 60, 72, 84, and 96.) Ask a student to write the multiples of 12 on the chalkboard as they are recited.

Say, "Now use your red discs to cover all the multiples of 8. What numbers did you cover?" ( I covered 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, and 96.) Ask a student to write the multiples of 8 on the chalkboard as they are recited. Say, "How can we find which multiples are common to both 12 and 8? (We can look for the multiples that are covered by both a blue disc and a red disc.) Which are the common multiples of 12 and 8?" (The common multiples of 12 and 8 are 24, 48, 72 and 96.) Ask a student to circle the common multiples at the chalkboard as they are recited. On the chalkboard write: The common multiples of 12 and 8 are 24, 48, 72, 96. Ask the students to write the lists of multiples, as well as the list of common multiples in their notebooks.

Repeat this procedure using other pairs or groups of numbers.

**STRATEGY 2:** Prepare and display the following chart:

| Number | Multiples | Common Multiples |
|---|---|---|
| | | |

Say, "We have used a similar chart to find the common factors of numbers. Now we will use a chart to find the common multiples of numbers. What do we mean by multiples of numbers? (Multiples are numbers we say

**STRATEGY 2** cont'd

when we count by the given number.) What do you think common multiples are?" (Common multiples are multiples which two or more numbers have in common.)

Say, "We will find the common multiples of 6 and 8." On the chart, write the number 6 in the first column. Ask the students to recite the multiples of 6, through 60, as one student writes them on the chart.

e.g.,

| Number | Multiples | Common Multiples |
|---|---|---|
| 6 | 6, 12, 18, 24, 30, | |
| | 36, 42, 48, 54, 60 | |

Repeat this procedure for the multiples of 8. Say, "Which multiples do 6 and 8 have in common?" (6 and 8 both have 24 and 48 as common multiples.) Ask a student to circle the common multiples and list them again in the third column.

e.g.,

| Number | Multiples | Common Multiples |
|---|---|---|
| 6 | 6, 12, 18, ㉔, 30 | |
| | 36, 42, ㊽, 54, 60 | |
| | | 24, 48 |
| 8 | 8, 16, ㉔, 32, 40 | |
| | ㊽, 56, 64, 72, 80 | |

Repeat this procedure using other sets of numbers.

**4.06.07.04** **find the least common multiple of a set of whole numbers**

**STRATEGY 1:** Prepare and distribute the discs and the hundred chart used in Strategy 1, P.O. 4.06.07.03. Say, "Use your blue discs to cover all the multiples of 6. Use your red discs to cover all the multiples of 9. How do we find the common multiples of 6 and 9? (The numbers covered by both a blue and a red disc are the common multiples of 6 and 9.) What are the common

**STRATEGY 1:** cont'd

multiples of 6 and 9?" (The common multiples of 6 and 9 are 18, 36, and 54.) On the chalkboard write: The common multiples of 6 and 9 are 18, 36, 54. Ask the students to write this in their notebooks. Say, "Of these three multiples which 6 and 9 have in common, which is the least common multiple? (18 is the least common multiple of 6 and 9.) We abbreviate 'least common multiple' by using the initials LCM." On the chalkboard write: The least common multiple (LCM) of 6 and 9 is 18. Ask the students to write this in their notebooks. Repeat this procedure using other sets of numbers.

**STRATEGY 2:**

Display the chart prepared in Strategy 2, P.O. 4.06.07.03. Say, "How did we find the common multiples of 6 and 8? (We listed the first ten multiples of 6 and 8. Then we circled all the multiples they had in common. We listed the common multiples in the third column.) What are the common multiples of 6 and 8?" (The common multiples of 6 and 8 are 24 and 48.)

Label the fourth column on the chart, **Least Common Mutiple (LCM)**. Say, "The least common multiple, or LCM, is the multiple which is lowest in value. Which is the least common multiple of 6 and 8?" (The least common multiple of 6 and 8 is 24.) Ask a student to write 24 in the last column on the chart.

Repeat this procedure to find the least common multiple of other sets of numbers.

P.O. 4.06.07.01-.02

NAME: ______________________ CLASS: __________ DATE: ________

List the factors for each group of numbers below. List the common factor. Find the greatest common factor.

**6 20**

The factors of 6 are ______________________.

The factors of 20 are ______________________.

The common factors of 6 and 20 are ______________________.

The greatest common factor of 6 and 20 is ______________.

**16 24**

The factors of 16 are ______________________.

The factors of 24 are ______________________.

The common factors of 16 and 24 are ______________________.

The greatest common factor of 16 and 24 is ______________.

**12 18 24**

The factors of 12 are ______________________.

The factors of 18 are ______________________.

The factors of 24 are ______________________.

The common factors of 12, 18, and 24 are ______________.

The greatest common factor of 12, 18, and 24 is ________.

**14 16 22**

The factors of 14 are ______________________.

The factors of 16 are ______________________.

The factors of 22 are ______________________.

The common factors of 14, 16, and 22 are ______________.

The greatest common factor of 14, 16, and 22 is ________.

628

P.O. 4.06.07.03-.04

NAME: ______________________ CLASS: __________ DATE: ________

Circle the common multiples for each group of numbers below.
Write the least common multiple (LCM).

6 | 6 8 | 50

18 12 [✓ 24] [✓ 48] 15

26 30 36 [✓ 72] 32

The least common multiple of 6 and 8 is 24.

---

36 | 12 8 | 40

96 12 24 60 64

48 16 32 56 72

The least common multiple of 12 and 8 is ______.

---

12 | 2 8 4 | 64

24 4 20 40

84

8 16 26 30 70

The least common multiple of 2, 8, and 4 is _____.

---

96 | 6 16 24 | 12

32 80 66 48

36 6 64 10 38 16

The least common multiple of 6, 16, and 24 is ______.

# SHARPENING YOUR SKILLS

**Units 56, 57, 58**

**Name** ____________________ **Class:** __________ **Date:** __________

1. Hal wants to buy a bicycle. The store sells 3-speed, 5-speed, and 10-speed bikes. Each type of bike comes in blue, red, green, or white. How many choices does Hal have?

ⓐ 18 ⓒ 7

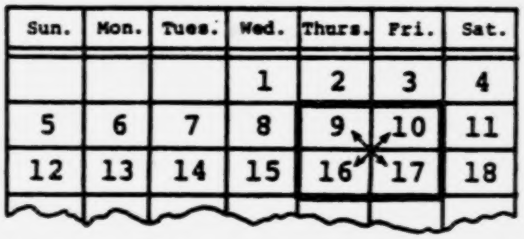
ⓑ 12 ⓓ Not Here

2. A clown has a striped shirt and a polka-dot shirt. She has plaid pants, striped pants, and polka-dot pants. How many different outfits can she make?

ⓔ 5 ⓖ 6

ⓕ 3 ⓗ Not Here

3.



| Sun. | Mon. | Tues. | Wed. | Thurs. | Fri. | Sat. |
|---|---|---|---|---|---|---|
|  |  |  | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |

If you add the numbers in the box diagonally, what pattern do you notice?

______________________________

______________________________

______________________________

Draw a box around 4 other numbers. Did you notice the same thing? _____

4. What are the common factors of 8 and 12?

ⓐ 1,2,4 ⓒ 2,4,6,12

ⓑ 1,2,3,4 ⓓ Not Here

5. List all the factors of 12 and 24.

Factors of 12 = ______

______________________________

Factors of 24 = ______

______________________________

6. What is the greatest common factor of 10 and 15?

ⓔ 3 ⓖ 10

ⓕ 5 ⓗ Not Here

7. What is the greatest common factor of 8,12, and 16?

ⓐ 4 ⓒ 2

ⓑ 8 ⓓ Not Here

8. What is the least common multiple of 2 and 5?

ⓔ 2 ⓖ 10

ⓕ 1 ⓗ Not Here

9. The least common multiple of 6 and 8 is ________.

## 4.10.07 AREA

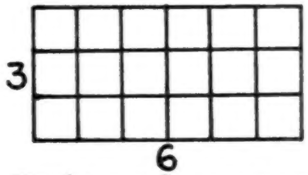
(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.10.07.01A define and measure the area of a rectangle by finding the number of square units contained in the rectangle;

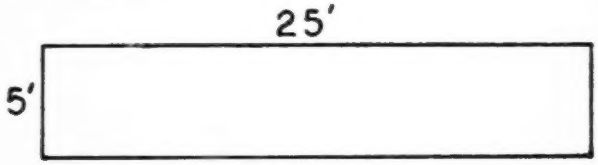
e.g.,



Number of squares per row = 6
Number of rows = 3
Number of squares in the rectangle = 18
Area = 18 square units

4.10.07.02B develop and use a formula to find the area of a rectangle.

e.g.,



What is the area of a chalkboard with the following dimensions?

l = 25'
w = 5'
A = l x w
A = 25' x 5'
A = 125 square feet

4.10.07

## VOCABULARY

### TERMS

area
square unit
region

## GETTING STARTED 1:

Prepare and display a rectangular sheet of paper and a variety of items, e.g., pencils, keys, rubber bands, paper clips, index cards, postage stamps. Say, "Which of these objects could easily be used to completely cover this sheet of paper leaving no gaps?" (The index cards or postage stamps can cover the sheet of paper with no gaps.) Ask a student to demonstrate this on the sheet of paper. Say, "Why can't we use the pencils (keys, ...) to completely cover the piece of paper?" (The pencils, keys,... would leave gaps.) Ask several students to demonstrate this on the sheet of paper.

Say, "What kind of items are better than others to cover a flat, or plane, area?" (Any item that has straight sides and square corners is better at covering a plane area.) Ask the students to name other items in the classroom with straight sides and square corners that would cover the sheet of paper leaving no gaps. (Accept any reasonable responses, e.g., books, blocks, erasers.

## GETTING STARTED 2:

Prepare several oaktag rectangles of equal size and a supply of colored rods. Distribute a rectangle and a supply of orange rods to one group, a rectangle and a supply of red rods to another group, ... Say, "We will use our rods to cover the rectangle without leaving any gaps. Look at your rods and your rectangle. About how many rods do you think you will use?" Record the color of the rods used by each group and their estimates on a chart on the chalkboard.

**GETTING STARTED 2:** cont'd

e.g.,

| Group | Color of Rods Used | Estimate | Actual Number of Rods Used |
|---|---|---|---|
| | | | |

Ask the students to use their rods to cover the rectangle. Say, "How many rods did you need to completely cover the rectangle?" As each group states the number of rods needed, ask one student from the group to write the actual measure on the chart in the appropriate column. Compare the estimates with the actual findings. Say, "Why did each group need a different number of rods to cover the rectangles which are all the same size." (The size of the rods used by the different groups was not the same. Groups using large rods needed fewer rods than groups using small rods.)

**4.10.07**

**4.10.07.01** **define and measure the area of a rectangle by finding the number of square units contained in the rectangle**

**STRATEGY 1:** Prepare and distribute a sheet of one-inch graph paper (see Resource Material), one large rectangle (5 inches by 7 inches) and one small rectangle (2 inches by 3 inches) to each student or group of students. Say, "What did we discover when we tried to cover a sheet of paper with different objects? (We discovered that objects with straight sides and square corners covered the paper without leaving any gaps.) Today we will use the square units on our graph paper to cover the two rectangles." Ask the students to place the large rectangle on the graph paper, line up a corner of the rectangle with the corner of a box on the graph paper, and trace around the rectangle. Repeat this procedure with the small rectangle. Say, "Count the number of graph paper boxes inside the tracing of each rectangle. This is the number of square units needed to cover each rectangle completely. Which figure needed more squares to cover it? (The larger rectangle needed more squares to cover it.) Why? (The larger rectangle has more space to cover.) We call that space the area of the rectangle and we measure it using square units. Our graph paper boxes are squares that measure one inch on each side. Therefore, we can call each box a square inch. How many square inches are needed to fill the space of the large rectangle? ... the small rectangle?" Record the data on the chalkboard.

Say, "What do we mean by the area of a rectangle?" (The area is the number of square units needed to completely cover the face of the figure.) Say and

**STRATEGY 1:** cont'd

write on the chalkboard, "We measure the area of a rectangle by finding the number of square units it contains." Ask the students to write this definition in their notebooks.

**STRATEGY 2:**

Prepare and display a supply of one-inch squares and several rectangular boxes, e.g., cardboard shoe box, gift box, ... Pointing to the shoe box, say, "We want to cover the bottom of this box with construction paper. How can we find out how much paper we will need? (We must measure the space at the bottom of the box.) How can we use these one-inch squares to help us measure?" (We can cover the bottom of the box with the one-inch squares.) Ask several students to take turns placing the squares on the bottom of the box until it is completely covered. Say, "We call these one-inch squares 'square inches'. How many of the square inches were needed to completely cover the space on the bottom of the box?" Record the answer on the chalkboard.

Say, "We have just measured the area of the bottom of the box." On the chalkboard, write the following: The area of a rectangle is the number of square units it contains. Ask the students to read this definition and to write it in their notebooks.

Repeat this procedure to measure the area of the bottom of the other boxes.

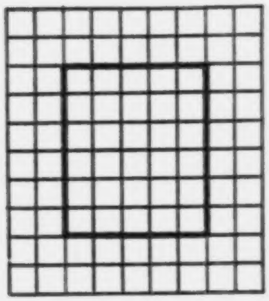
**Note:** Leave the square inches in the bottom of the boxes as they will be used in Strategy 2, P.O. 4.10.07.02.

**4.10.07**

**4.10.07.02** **develop and use a formula to find the area of a rectangle**

**STRATEGY 1:** Prepare and display a rectangle drawn on one-inch graph paper.

e.g.,

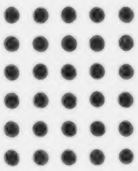


Say, "What do we mean when we talk about the area of a rectangle? (We are talking about the number of square units needed to completely cover it.) How can we find the area of this rectangle drawn on the graph paper?" (We can count the number of boxes, or square inches, that cover the inside of the rectangle.) Ask a student to count the boxes and record the area on the chalkboard;

e.g.,

Area = 30 square inches

Draw the following array on the chalkboard:



Say, "How is this array similar to the rectangle drawn on the graph paper? (They both have rows and columns.) How can we find the total number of dots in this array? (We can add all the items or we can multiply the number of rows, 6, by the number of columns, 5, for a total of 30.) We can use this same method to find the area of a

**STRATEGY 1:** cont'd

rectangle. How many rows of graph paper boxes, or square inches, are in the rectangle? (There are 6 rows.) How many columns are there? (There are 5 columns.) When we multiply the number of rows times the number of columns, we are really multiplying the length times the width. Each box on the graph paper is 1 inch long. Measuring with these inches, how long is the left side of the rectangle? (It is 6 inches long.) We will call this the length. How long is the line at the top of the rectangle, the width? (The width is 5 inches.) Since multiplying the rows times the columns is just like multiplying the length times the width, we can write a formula to find the area of a rectangle." On the chalkboard, write: Area = length x width. Ask the students to write the formula in their notebooks. Say, "Use this formula to find the area of the rectangle." Ask a student to work at the chalkboard as the other students work in their notebooks. Remind the students that their answer must be expressed in square units.

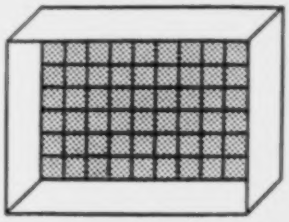
e.g.,

Area = length x width
Area = 6 in. x 5 in.
Area = 30 sq. in.

Continue to use the formula to find the area of other rectangles.

**STRATEGY 2:** Prepare and display one of the boxes used in Strategy 2, P.O. 4.10.07.01.

e.g.,



**STRATEGY 2:** cont'd

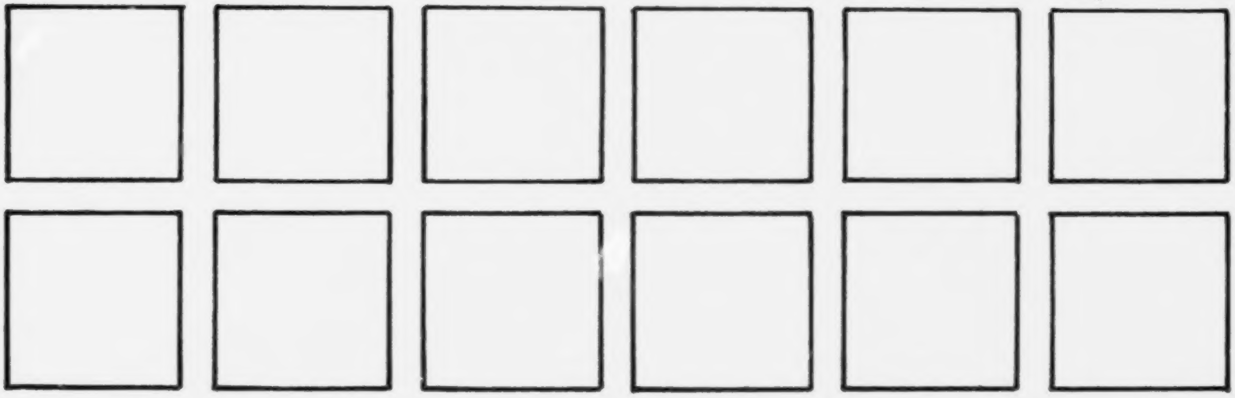
Say, "We covered the bottoms of these boxes with small squares called square inches to measure the area of the rectangular space. Now we will learn a shortcut for finding the area of a rectangle. Say, "How many square inches were needed to cover the bottom of this box? Record the answer on the chalkboard, e.g., 54 square inches. Say, "How long is this box? (It is 9 inches long.) How do you know? (Since each square inch is one inch long, I can use them to measure the length of the box.) How wide is the box?" (The box is 6 inches wide.) Ask a student to write the length and width on the chalkboard. Say, "If we did not have the square inches in the box to help us measure the length and the width, what else could we have used? (We could have measured with a ruler.) What relationship do you notice among the length, width, and area listed on the chalkboard? (The area is the product of the length and the width.) Yes, we can use this as a formula to find the area of a rectangle without covering it with all the small square units." On the chalkboard, write: Area = length X width. Ask the students to write the formula in their notebooks and to use the formula to find the area of the bottoms of the other boxes as well as the area of other rectangles.

P.O. 4.10.07.01

NAME:__________________________________ CLASS:__________ DATE:________

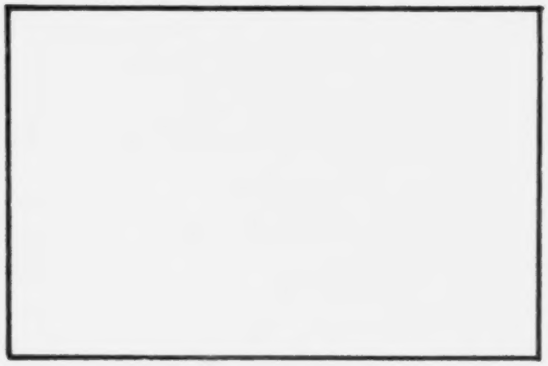
Follow the directions below.

A. Each small square is 1 square inch. Cut out each square inch.



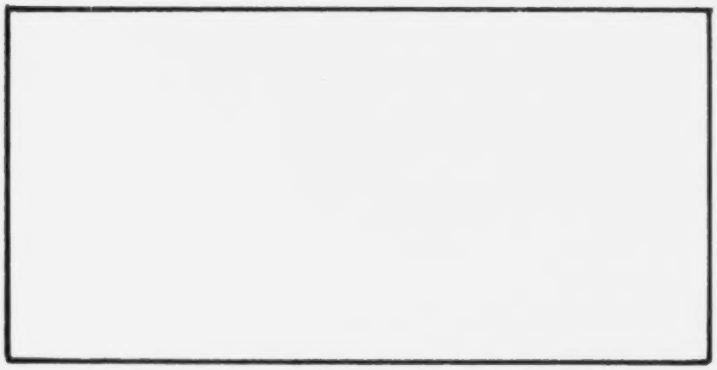
B. Use the square inches to find the area of each figure below.

1.



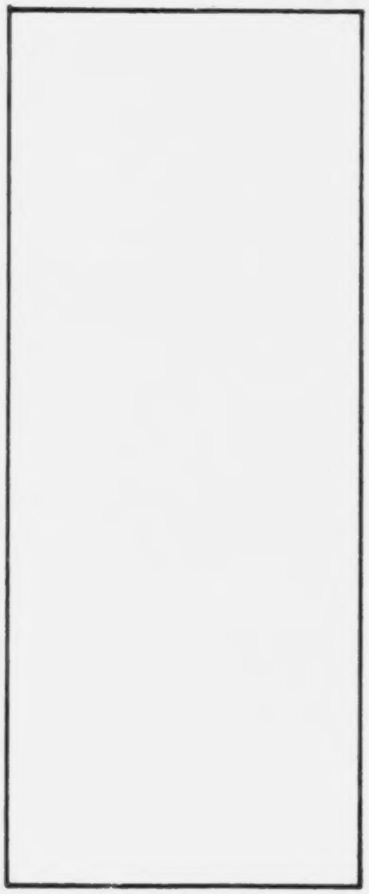
Area =_____square inches

2.



Area =_____square inches

3.



Area =_____square inches

P.O. 4.10.07.02

NAME: ______________________ CLASS: __________ DATE: ________

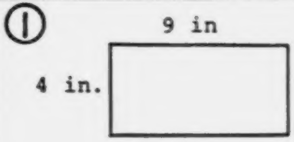
Follow the directions below.

A. Circle the correct words to complete the sentence below.

To find the area of a rectangle, we (add, multiply) the length and the (width, inside).

B. Use the formula to find the area of each rectangle below.

①

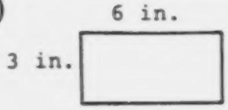


Area = length x width

Area = 4 in. x 9 in.

Area = 36 sq. in.

②

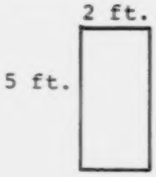


Area = length x width

Area = ______ x ______

Area = ______ sq. in.

③

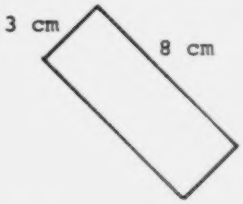


Area = ____________

Area = ______ x ______

Area = ______ sq. ft.

④

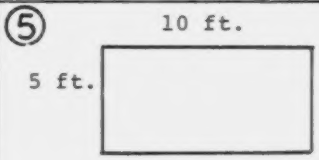


Area = ____________

Area = ______ x ______

Area = ______ sq. cm

⑤

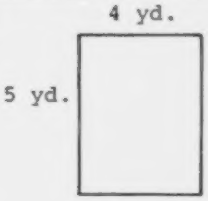


Area = ____________

Area = ______ x ______

Area = ______ sq. ft.

⑥

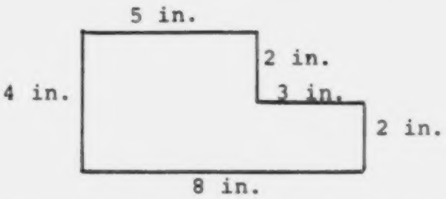


Area = ____________

Area = ______ x ______

Area = ______ sq. yd.

**CHALLENGE!** Can you find the area of this figure?


5 in.
2 in.
3 in.
4 in.
2 in.
8 in.

Hint: Draw a line that will form 2 rectangles from this figure.

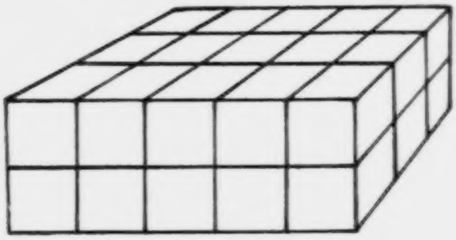
## 4.10.08 VOLUME

(1-2 lessons)

### PERFORMANCE OBJECTIVES

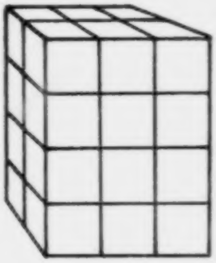
The student will be able to...

4.10.08.01A define and measure the volume of a rectangular prism (block) as the number of cubic units contained in the block; e.g.,



Number of rows = 3
Number of cubic units in each row = 5
Number of layers = 2
Volume = 30 cubic units

4.10.08.02B develop and use a formula to find the volume of a rectangular prism (block). e.g.,



How many cubic inches are in this block?
Volume = length x width x height
Volume = 2 in. x 3 in. x 4 in.
Volume = 24 cubic inches

4.10.08

## VOCABULARY

### TERMS

| | |
|---|---|
| volume | length |
| cube | width |
| cubic unit | height |
| rectangular prism | |

---

### GETTING STARTED 1:

Prepare and display several different rectangular pieces of drawing paper. Say, "How can we measure the area of these rectangles?" (We can measure the length and the width of each rectangle. If we know the length and the width, we can multiply these numbers to find the area.) What kind of units are used to measure area? (We use square units to measure area.) Why?" (When we find the area, we are finding the number of square units needed to completely cover the rectangle.) Ask a student to write the formula we use to find the area of a rectangle on the chalkboard, e.g., Area = length x width. Ask several students to measure the length and width of each rectangle and record the data on the chalkboard. Ask the students to use the formula to find the area of each rectangle.

---

### GETTING STARTED 2:

Prepare and display a rectangular prism (box), whose dimensions can be measured in exact inches or centimeters. Ask the students to describe the box in terms of faces, vertices, and angles, e.g., It has 6 faces, 8 vertices, and 24 right angles.

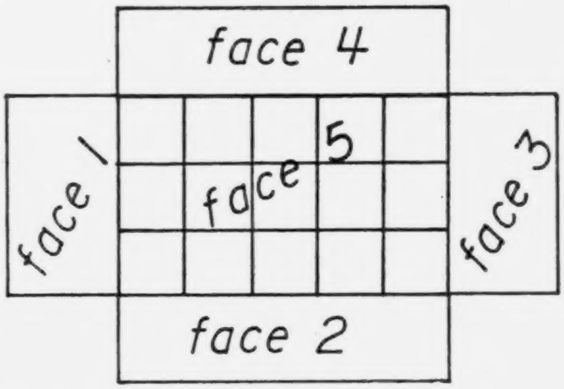
Say, "If we want to measure the area of each face of this box, what do we have to do? (We have to measure the length and width of each face and then use the formula, Area = length x width.) If this box were filled with marbles, would there be any spaces inside? Explain. (There would be spaces because marbles are round and don't match up side to side.) If we filled the box with one inch cubes or centimeter cubes, arranged side by side, would there be any spaces or gaps? Explain." (There would be no spaces because the faces of the blocks would match one against the other.) What shapes are good for completely filling rectangular prisms?" (Other rectangular prisms, or blocks, are best for completely filling rectangular prisms.)

**4.10.08**

**4.10.08.01** **define and measure the volume of a rectangular prism (block) as the number of cubic units contained in the block**

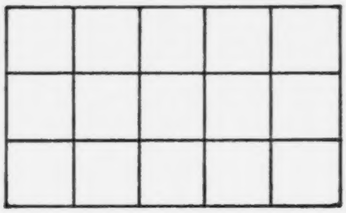
**STRATEGY 1:** Prepare a supply of one-inch cubes and a rectangular prism (cardboard box), whose dimensions can be measured in exact inches, which has been cut at its edges and marked in square inches on face 5.

e.g.,



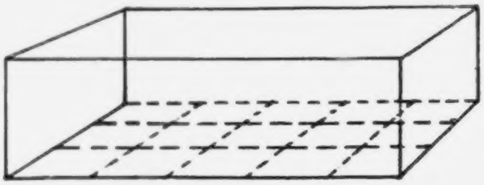
Fold back faces 1, 2, 3, and 4.

e.g.,



Say, "How can we find the area of this face?" (We can find the area by counting the number of squares needed to completely cover the face.) Refold the box and tape it at its edges.

e.g.,

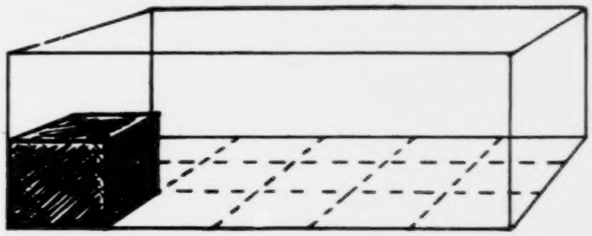


Say, "Today we will find the volume of this box, or rectangular prism, by finding the number of cubes, or cubic units, needed to fill the box. We found the area of a plane surface by covering it with square units. We can find the volume of a space figure by finding the number of cubic units contained in the

**STRATEGY 1:** cont'd

figure." Demonstrate and count the number of cubic inches needed to fill the box.

e.g.,



Say, "How many rows of cubes did we use? (We used 3 rows of cubes.) How many cubes were in each row? (There were 5 cubes in each row.) How many layers, with 3 rows of 5 cubes in each layer, did we use? (We used 2 layers.) How many cubes were needed, in all, to fill this box? (We needed 30 cubes.) The volume of this box is 30 cubic inches."

Record this data on the chalkboard and ask the students to write it in their notebooks.

e.g.,

Number of rows = 3
Number of cubes in each row = 5
Number of layers = 2
Volume = 30 cubic inches

**4.10.08.02** **develop and use a formula to find the volume of a rectangular prism**

**STRATEGY 1:** Prepare and display the box and the one-inch cubes used in Strategy 1, P.O.4.10.08.01. Ask a student to use the cubes to fill the box. Say, "How did we measure the volume of this rectangular prism? (We counted the number of cubic units needed to fill the rectangular prism.) Now we will learn a shorter way to find the volume by using a formula. When we learned a formula to measure the area of a plane rectangular figure, what did we need to know? (We

**STRATEGY 1:** cont'd

needed to know the length and the width of the rectangle.) How did knowing these measurements help us find the area? (We multiplied the length times the width to find the area.) We can use a formula to find the volume of a rectangular prism if we know its measurements. However, besides the length and width, we will also need to know its height. Without using a ruler how can we find these measurements? (Each cube we used is one inch long, one inch wide, and one inch high. We can use them to count the number of inches in the box's length, width, and height.) How many inches long is the box? (It is 5 inches long.) How wide is the box? (It is 3 inches wide.) How high is the box? (It is 2 inches high.) To find the volume, we multiply all three measurements.

On the chalkboard write:
Volume = length x width x height.
Say, "We can also write the formula a shorter way, using 'l' to represent length, 'w' to represent width, and 'h' to represent height." On the chalkboard write: Volume = l x w x h. Ask a student to write the appropriate measurements below each letter in the formula and multiply to find the volume. Ask the other students to write it in their notebooks.
e.g.,

Volume = l x w x h
Volume = 5 in. x 3 in x 2 in.
Volume = 30 cubic inches

Say, "Is this product the same number we got when we counted the cubes that filled the box? (Yes.) How do the numbers in the formula relate to the cubes in the box?" (5 is also the number of cubes in each row. 3 is the number of rows. 2 is the number of layers.)

Repeat this procedure using the formula to find the volume of other rectangular prisms.

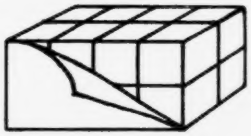
P.O. 4.10.08.01-.02

NAME:______________________________ CLASS:__________ DATE:________

Follow the directions below.

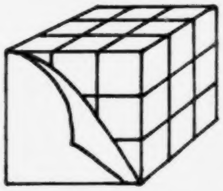
A. Count the cubes to find the volume of each rectangular prism below.

1.



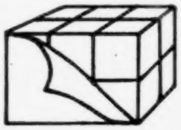
Volume = _______cubic units

2.



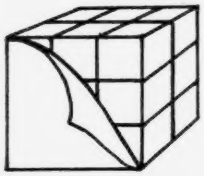
Volume = _______cubic units

3.



Volume = _______cubic units

4.

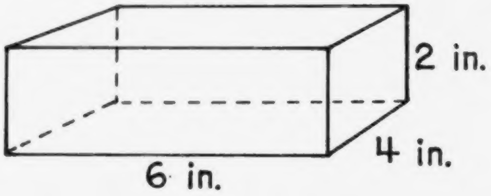


Volume = _______cubic units

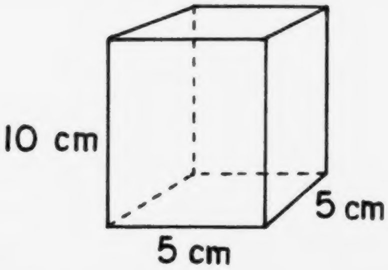
B. Complete the formula below.

Volume = ______________________________

C. Use the formula to find the volume of the following rectangular prisms.



Volume = ______________



Volume = ______________

## 4.07.03 ADDITION AND SUBTRACTION OF DECIMALS TO HUNDREDTHS

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.07.03.01A add decimals to hundredths;

e.g.,

$$\begin{array}{r} 1.3 \\ +1.5 \\ \hline 2.8 \end{array} \qquad \begin{array}{r} 5.07 \\ +4.12 \\ \hline 9.19 \end{array} \qquad 0.4 + 0.37 + 0.19 + 0.02 = 0.98$$

4.07.03.02A subtract decimals to hundredths;

e.g.,

$$\begin{array}{r} 2.8 \\ -0.4 \\ \hline 2.4 \end{array} \qquad \begin{array}{r} 0.37 \\ -0.14 \\ \hline 0.23 \end{array} \qquad \begin{array}{r} 5.\overset{7}{\cancel{8}}\overset{10}{\cancel{0}} \\ -3.56 \\ \hline 2.24 \end{array}$$

4.07.03.03A solve word problems related to skills learned in this module.

e.g.,

> Stanley went shopping. He bought cheese that weighed 2.03 pounds and fish that weighed 3.50 pounds. How much did the cheese and chicken weigh together?

## VOCABULARY

### TERMS

decimal
tenths
hundredths

---

## GETTING STARTED 1:

Prepare 25 blank cards which will be used to play Concentration. On 12 of the cards, write a fraction expressed in tenths or hundredths.

e.g., $\boxed{\frac{5}{10}}$ $\boxed{\frac{12}{100}}$

On 12 other cards, write the decimals which are equivalent to those on the fraction cards, e.g., $\boxed{0.5}$ $\boxed{0.12}$. On the remaining card, write a fraction or a decimal that is not equivalent to any of the other cards. Shuffle all the cards and tape them face down on the chalkboard in rows of 5 cards each.

Divide the class into two teams. Say, "Some of these cards have fractions on them. Other cards have decimals. A member from Team A will turn over two cards. If the cards have a fraction and a decimal that are equivalent in value, the team keeps the cards and goes again. If no match is made, the cards are turned face down again and Team B has a turn."

Play the game until only the one unmatched card is left on the chalkboard. At that time, the team with the most pairs of matched cards is the winner.

---

## GETTING STARTED 2:

Prepare and display squared material (hundreds and tens) and a list of decimals through hundredths.

e.g., 0.3
0.45
0.16
0.04
0.9
1.2
3.5

**GETTING STARTED 2:** cont'd

Ask the students to read the decimals aloud. Say, "Which decimals are expressed in tenths? (0.3, 0.9, 1.2, and 3.5 are expressed in tenths.) How could we express these numerals as hundredths?" (We could write a zero in the hundredths place of each decimal expressed in tenths.) Ask a student to rewrite as hundredths the numerals expressed as tenths.

e.g.,

0.3 = 0.30
0.9 = 0.90
1.2 = 1.20
3.5 = 3.50

Say, "We can prove that placing a zero in the hundredths place in these numerals does not change their value." Display one hundred card. Say, "This represents one whole unit." Display one ten strip. Say, "What part of the whole does this represent? (Each strip represents one-tenth of the whole.) What do 3 of these strips represent? (Three strips represent three-tenths.) If we look at the small boxes on the hundred card how many are there? (There are one hundred small boxes.) What name can we give to one of these boxes? (Each small box is one-hundredth of the whole.) Look at the 3 tenths. How many hundredths are equivalent to three-tenths? (30 hundredths are equivalent to 3 tenths.) Therefore, .3 is worth the same as .30." Repeat this procedure for the remaining tenths expressed as hundredths.

**4.07.03**

**4.07.03.01 add decimals to hundredths**

**STRATEGY 1:** Prepare and distribute squared material (hundreds, tens, and ones) to each student or group of students. Write an example on the chalkboard and ask the students to write it in their notebooks.

e.g.,

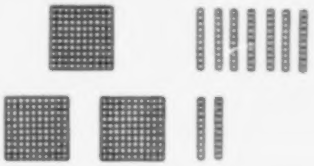
1.7
+2.2

Ask a student to read the example aloud. Say, "How can we use our squared material to solve this example? (We can use the large squares to represent ones, the strips can represent tenths, and the small squares can represent hundredths.) Use your squared material to represent these addends." Ask one student to represent them at the chalkboard.

e.g.,

1.7

+2.2



Say, "What is the total of your squared material? (The total is 3 and 9 tenths.) Let's see how we can find the same total by completing the example. We add decimals the same way we add whole numbers, beginning with the column farthest to the right. What column is that? (The column farthest to the right in this example is tenths.) How much is 7 tenths and 2 tenths?" (7 tenths and 2 tenths equal 9 tenths.) Ask a student to write the digit 9 in the tenths column in the sum. Say, "How can we show that this 9 is in the tenths column? (We must place the decimal point to the left of the 9.) Ask a student to place the decimal point and to add the ones. Say, "How many ones are there in all? (There are 3 ones.) What is the sum? (The sum is 3 and 9 tenths.) This is the same as when we counted the total squared material. We can write this as 3.9."

**STRATEGY 1:** cont'd

Repeat this procedure with other examples through hundredths, with and without regrouping.

e.g.,

$$\begin{array}{r} 0.06 \\ \underline{+0.25} \end{array} \qquad \begin{array}{r} 1.5 \\ \underline{+3.8} \end{array} \qquad \begin{array}{r} 0.26 \\ \underline{+0.11} \end{array} \qquad \begin{array}{r} 1.5 \\ \underline{+2.36} \end{array}$$

**Note:** When adding examples involving both tenths and hundredths, students should express the tenths as hundredths by placing a zero in the hundredths column.

e.g.,

$$\begin{array}{r} 1.3 \\ \underline{+2.35} \end{array} = \begin{array}{r} 1.30 \\ \underline{+2.35} \end{array}$$

**STRATEGY 2:**

Prepare and display a place value chart through hundredths. Ask a student to write 4 and 2 tenths on the place value chart. Ask another student to write 3 and 16 hundredths under it on the chart. Write a plus symbol to the left of the second addend.

e.g.,

| Tens | Ones | . | Tenths | Hundredths |
|---|---|---|---|---|
| | 4 | . | 2 | |
| + | 3 | . | 1 | 6 |
| | | | | |

Say, "We will use the place value chart to find the sum. When we add, we always keep the numbers lined up on the right side. How can we do that in this example without changing the place value of any of the numbers?" (We can express 4.2 as 4.20. Placing a zero in the hundredths place does not change the value of that number.) Ask a student to place a zero in the hundredths column in the first addend. Say, "How many hundredths are there in all?" (There are 6 hundredths.) Ask a student to write 6 in the hundredths place in the sum. Repeat this procedure with the digits in the other places. Say, "We must

**STRATEGY 2:** cont'd

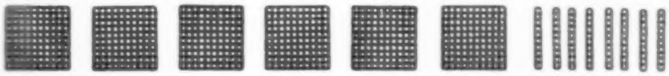
write the decimal point in the sum." Ask a student to place the decimal point in the sum, e.g., 7.36. Say, "What is the sum?" (The sum is 7 and 36 hundredths.) Ask the students to complete the example in their notebooks.

Repeat this procedure using other examples, eventually eliminating the place value chart.

**4.07.03.02** **subtract decimals to hundredths**

**STRATEGY 1:** Prepare and distribute a set of squared material to each student or group of students. Say, "What do the large squares represent? (The large squares represent whole units.) How many strips make one whole unit? (Ten strips make one whole unit.) What does each strip represent? (Each strip represents one-tenth of the whole.) How many small squares equal one whole? (One hundred small squares equal one whole.) What part of the whole do the small squares represent? (They represent one-hundredth of the whole.) How would we represent 6.8? (We would use 6 large squares and 8 strips.) Use your squared material to represent 6.8."

e.g.,



Write the following example on the chalkboard:

$$\begin{array}{r} 6.8 \\ \underline{-2.4} \end{array}$$

Ask the students to write the example in their notebooks. Say, "We always begin subtracting on the right, just as we do with whole numbers. In which column will we begin? (We will begin with the tenths.) Use your squared material to solve this example. How much is 8 tenths minus 4 tenths?" (8 tenths minus 4 tenths equals 4 tenths.) Ask a student to write 4 tenths in the difference, including the decimal point. Ask the students to write the example in their notebooks.

**STRATEGY 1:** cont'd

Repeat this procedure subtracting the ones. Say, "What is the difference? (The difference is 4.4.) Say, "How can we check our answer?" (We can add to check the answer.) Ask a student to write the check on the chalkboard as the other students write it in their notebooks.

e.g., check

$$\begin{array}{r} 4.4 \\ +2.4 \\ \hline 6.8 \end{array}$$

Repeat this procedure with other examples, having minuends and subtrahends through hundredths, with and without regrouping.

See **Note** after Strategy 1, P.O.4.07.03.01.

**STRATEGY 2:** Prepare and display a place value chart through hundredths and a subtraction example.

e.g.,

| Tens | Ones | . | Tenths | Hundredths |
|---|---|---|---|---|
| | 9 | . | 1 | 2 |
| – | 5 | . | 6 | |

Ask the students to write the example in their notebooks. Say, "We subtract decimals the same way we subtract whole numbers. We must remember, however, to place the decimal point in the difference. As with whole numbers, we begin subtracting on the right. What do you notice about the digits in the hundredths column? (The subtrahend has no digit in the hundredths place while the minuend does.) What can we do so that both numbers have a digit in the hundredths place? (We can place a zero in the hundredths place in the subtrahend.) Will that change the value of the number? Explain." (No, 5.6 has the same value as 5.60.) Ask a student to write the zero in the hundredths place on the place value chart on the chalkboard.

e.g.,

| Tens | Ones | . | Tenths | Hundredths |
|---|---|---|---|---|
| | 9 | . | 1 | 2 |
| – | 5 | . | 6 | 0 |

**STRATEGY 2:** cont'd

Say, "How much is 2 hundredths minus 0?" (2 hundredths minus zero is 2 hundredths.) Ask a student to write 2 hundredths in the difference on the chalkboard as the other students write it in their notebooks. Say, "Why can't we subtract the tenths? (1 tenth is less than 6 tenths.) How can we get more tenths? (We can exchange 1 one for 10 tenths.) How many ones will we have then? (We will have 8 ones.) How many tenths will we have then?" (We will have 11 tenths.) Ask a student to show the exchange at the chalkboard and subtract as the other students do the same in their notebooks. Say, "How many tenths are left?" (5 tenths are left.) Ask a student to subtract the ones at the chalkboard as the other students work in their notebooks. Say, "What is the difference? (The difference is 3.52.) How can we check our work?" (We can check by adding the difference to the subtrahend. The result should be the minuend.) Ask a student to write the check on the chalkboard as the other students write the check in their notebooks.

e.g.,

$$\begin{array}{r} \underline{\text{check}} \\ \overset{1}{3}.52 \\ \underline{+5.60} \\ 9.12 \end{array}$$

Repeat this procedure using other examples through hundredths, eventually eliminating the place value chart.

**4.07.03.03** solve word problems related to skills learned in this module

**STRATEGY 1:** Write a word problem on the chalkboard.

e.g.,

Mrs. Carter needed 3.50 pounds of chopped meat to make a meat loaf. She bought a package of chopped meat that weighted 1.82 pounds and another that weighed 1.86 pounds. Did she buy enough chopped meat?

**STRATEGY 1: cont'd** Say, "What do we have to find? We must find out if the total amount of chopped meat is at least 3.50 pounds.) What do we already know? (We know the weight of each package of chopped meat.) What must we do to solve the problem?" (We must add 1.82 and 1.86 and compare the sum to 3.50.) Ask a student to solve the problem at the chalkboard as the other students solve it in their notebooks.

e.g.,

$$\begin{array}{rl} 1.82 & \text{pounds} \\ \underline{+1.86} & \text{pounds} \\ 3.68 & \text{pounds} \end{array} \qquad 3.68 \text{ pounds} > 3.50 \text{ pounds}$$

Say, "Did Mrs. Carter buy enough chopped meat? Explain." (Mrs. Carter bought enough chopped meat because the sum, 3.68 pounds, is greater than the amount needed, 3.50 pounds.)

Repeat this procedure solving other word problems involving addition or subtraction of decimals through hundredths.

**STRATEGY 2:** Prepare and display a word problem on the chalkboard.

e.g.,

> Anna watched the scale as she weighed the food for her party. She had 1.24 pounds of ham, 0.73 pounds of cheese, 2.08 pounds of bologna, and 1.88 pounds of salami.
>
> a) How much did the ham and cheese weigh in all?
> b) How much did the bologna and salami weigh in all?
> c) How much more did the ham weigh than the cheese?

Say, "What are we asked to find? (We are asked to find the answers to three different questions. We must find the total weight of ham and cheese, the total weight of bologna and salami, and the difference between the weight of the ham and the weight of the cheese.) How should we begin?" (We can begin by adding together the weight of the ham and the weight of the cheese.)

**STRATEGY 2:** cont'd

Ask a student to show this on the chalkboard as the other students work in their notebooks.

e.g.,

$$\begin{array}{rl} 1.24 & \text{pounds of ham} \\ \underline{+0.73} & \underline{\text{pounds of cheese}} \\ 1.97 & \text{pounds of ham and cheese} \end{array}$$

Say, "What is the total weight of ham and cheese?" (The total is 1.97 pounds.) Ask another student to solve the second part of the problem at the chalkboard as the other students do the same in their notebooks.

e.g.,

$$\begin{array}{rl} 2.\overset{1}{0}8 & \text{pounds of bologna} \\ \underline{+1.88} & \underline{\text{pounds of salami}} \\ 3.96 & \text{pounds of bologna and salami} \end{array}$$

Say, "What is the total weight of salami and bologna? (The weight is 3.96 pounds.) How can we solve the last part of the problem?" (We must subtract 0.73 from 1.24.) Ask a student to solve and check this problem on the chalkboard as the other students write in their notebooks.

e.g.,

$$\begin{array}{rl} \overset{0}{\cancel{1}}.\overset{12}{\cancel{2}}4 & \text{pounds} \\ \underline{-0.73} & \underline{\text{pounds}} \\ 0.51 & \text{pounds} \end{array} \qquad \begin{array}{rl} & \underline{\text{check}} \\ \overset{1}{0}.51 & \text{pounds} \\ \underline{+0.73} & \underline{\text{pounds}} \\ 1.24 & \text{pounds} \end{array}$$

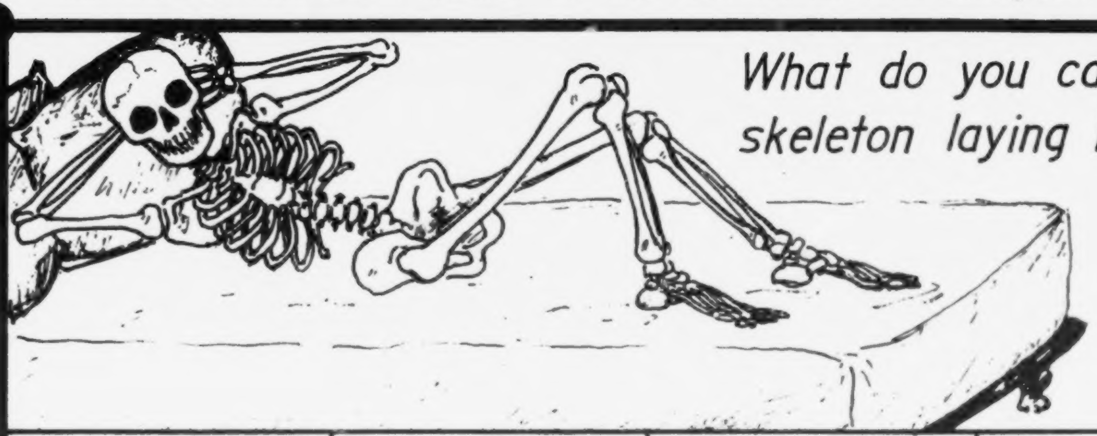
Say, "How much more ham than cheese is there?" (There is 0.51 pounds more ham.)

Repeat this procedure using other word problems.

P.O. 4.07.03.01-.02

NAME:______________________ CLASS:__________ DATE:________

Solve each example. Use the key to solve the riddle by writing the letter for each answer in the box below the example.



What do you call a skeleton laying in bed?

| | | | |
|---|---|---|---|
| 5.07<br>+4.12<br>9.19 | 0.40<br>0.37<br>0.19<br>+0.02 | 4.36<br>-2.18 | 7.63<br>+8.49 |
| L | ☐ | ☐ | ☐ |

| | | | | |
|---|---|---|---|---|
| 0.60<br>0.12<br>0.28<br>+1.30 | 1.19<br>-0.83 | 1.06<br>1.10<br>3.22<br>+4.35 | 7.36<br>-5.36 | 3.60<br>4.16<br>1.01<br>+2.24 |
| ☐ | ☐ | ☐ | ☐ | ☐ |

Key:

| A | B | E | L | N | O | S | Y | Z |
|---|---|---|---|---|---|---|---|---|
| 0.98 | 2.30 | 2.00 | 9.19 | 9.73 | 0.36 | 11.01 | 16.12 | 2.18 |

P.O. 4.07.03.03

NAME:______________________ CLASS:__________ DATE:________

Solve the problems below.

1. When Penny first started jogging, she ran 0.6 kilometers and then walked 0.75 kilometers. How far did she go in all?

   She went _____ kilometers.

2. Soon Penny was able to run 3.36 miles and walk 2.81 miles. How far could she go then?

   She could go ___ miles.

3. Penny ran in a race that was 5.50 miles long. After she ran 2.25 miles, how far did she still have to go?

   She had _____ miles to go.

4. Robert bought 3.75 pounds of ham and cheese. There was 1.54 pounds of ham. How much cheese did he buy?

   He bought ____ pounds of cheese.

5. Robert also bought two chickens. One chicken weighed 3.86 pounds and the other weighed 3.55 pounds. How much did the chickens weigh together?

   The chickens weighed ______ pounds.

6. Robert bought 1.5 pounds of bologna and 1.8 pounds of salami. How much did the bologna and the salami weigh together?

   The bologna and the salami weighed ______ pounds.

# SHARPENING YOUR SKILLS

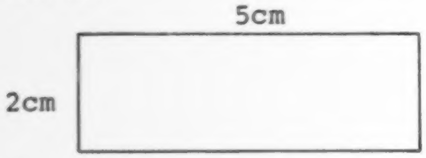
**Units 59,60,61**

**Name:** ____________________ **Class:** ____________ **Date:** ________

1. Write the formula used to find the area of a rectangle.

Area = ____________

2. What is the area of the rectangle below?



ⓐ 14 sq. cm ⓒ 20 sq. cm
ⓑ 10 sq. cm ⓓ Not Here

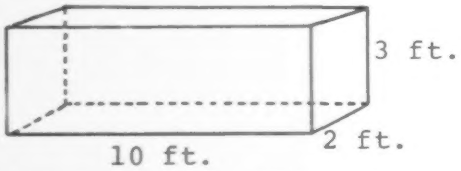
Find the area of a rectangular garden that is 7 feet long and 6 feet wide.

ⓔ 42 sq. ft. ⓖ 26 sq. ft.
ⓕ 13 sq. ft. ⓗ Not Here

4. Write the formula used to find the volume of a rectangular prism.

Volume = ___________

5. Find the volume.



ⓐ 15 cu. ft. ⓒ 60 cu. ft.
ⓑ 30 cu. ft. ⓓ Not Here

6. Find the sum.

$$\begin{array}{r}2.1\\1.5\\+3.7\\\hline\end{array}$$

ⓔ 6.13 ⓖ 73.0
ⓕ 7.3 ⓗ Not Here

7. Add.

$$\begin{array}{r}4.43\\+3.91\\\hline\end{array}$$

8. Subtract and check.

$$\begin{array}{r}8.7\\-1.9\\\hline\end{array}$$

9. Find the difference.

$$\begin{array}{r}5.6\\-2.4\\\hline\end{array}$$

ⓐ 8.0 ⓒ .32
ⓑ 32.0 ⓓ Not Here

10. Bob bought 2.56 pounds of chopped meat and 1.98 pounds of pork chops. Find the total weight of meat.

ⓔ 0.58 pounds ⓖ 4.54 pounds
ⓕ 3.44 pounds ⓗ Not Here

11. How much greater is 2.5 than 1.43? ______________

Unit 62

## 4.07.04 MULTIPLICATION AND DIVISION OF DECIMALS TO TENTHS

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.07.04.01A multiply decimals to tenths with products to hundredths;

e.g.,

$$\begin{array}{r} 2.4 \\ \underline{\times\ 0.2} \\ 0.48 \end{array} \qquad \begin{array}{r} 0.4 \\ \underline{\times 0.2} \\ 0.08 \end{array} \qquad \begin{array}{r} 3.5 \\ \underline{\times\quad 5} \\ 17.5 \end{array}$$

4.07.04.02A divide decimals with dividends to tenths by whole number divisors;

e.g.,

$$\begin{array}{r} 2.1 \\ 3\overline{)6.3} \end{array} \qquad \begin{array}{r} 4.8 \\ 2\overline{)9.6} \end{array}$$

4.07.04.03A solve word problems related to skills learned in this module.

e.g.,

> Find the area of a rectangle with a length of 2.4 meters and a width of .6 meters.

**4.07.04**

## VOCABULARY

### TERMS

decimal
tenths
hundredths
product
quotient
divisor
dividend

---

## GETTING STARTED 1:

Prepare and display a place value chart on the chalkboard. Write a multiplication example on the place value chart.

e.g.

| Hundreds | Tens | Ones |
|---|---|---|
| 2 | 4 | 7 |
| x | | 3 |

Say, "What numbers will we multiply? (We will multiply 247 by 3.) Where should we begin? (We should begin by multiplying the ones; 3 times 7 equals 21.) How will we write the 21 in the product? (21 equals 2 tens and 1 one. We will write the 1 in the ones column and write the 2 at the top of the tens column.) Why will we write the 2 at the top of the tens column?" (When we multiply the tens, we must remember to add these 2 tens to the product.) Ask a student to show this in the example at the chalkboard and ask the other students to write it in their notebooks. Continue multiplying until the example has been completed. Say, "What is the product?" (The product is 741.)

Repeat this procedure using other examples.

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## GETTING STARTED 2:

Prepare and display a place value chart through hundredths and a set of decimal numeral cards.

.g., 4.2 0.16 23.1 4.43 0.9

**GETTING STARTED 2:** cont'd

Shuffle the cards and place them face down on a desk. Divide the class into two teams. Ask a member of Team A to select a card, display it, read the numeral aloud, and write it on the place value chart.
e.g.,

4.43

| Hundreds | Tens | Ones | | Tenths | Hundredths |
|---|---|---|---|---|---|
| | | 4 | . | 4 | 3 |

If the student is correct, his/her team scores a point. Repeat this procedure, alternating teams, until one team scores 10 points.

**4.07.04**

**4.07.04.01** **multiply decimals to tenths with products to hundredths**

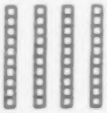
**STRATEGY 1:** Prepare and display paper facsimiles of squared material (hundreds, tens, and ones). Write the following example on the chalkboard:

$$\begin{array}{r} 0.4 \\ \underline{\times 0.2} \end{array}$$

Ask a student to read the example aloud. Say, "When we multiply fractions, we think of the multiplication symbol as representing the word 'of'. This is also true when we multiply decimals. We will use the strips to find 2 tenths of 4 tenths." Display the hundred square and say, "This represents one whole. What will we use to represent tenths? (The strips will represent tenths.) What will we use to represent hundredths?" (The small squares will represent hundredths.)

Ask a student to use the squared material to represent the factor, 0.4. Tape the strips to the chalkboard.

e.g.,



Say, "Now we must find 2 tenths of this amount. Each strip has ten rows, so each row can be thought of as 1 tenth of a strip. How many rows must we shade on each strip to represent 2 tenths?" (We must shade 2 rows on each strip.) Ask a student to shade 2 rows. Say, "What is the name of the amount that is shaded? Explain. (The shaded amount contains 8 small squares, or 8 hundredths.) Therefore, the product of 0.2 times 0.4 is 0.08. Let's see if we can solve the example to find the same product."

Ask the students to write the example in their notebooks. Say, "We multiply decimals the same way we multiply whole numbers, with one difference. We must

**STRATEGY 1:** cont'd

place a decimal point in the correct place in the product." Ask a student to perform the multiplication at the chalkboard as the other students work in their notebooks.

e.g.,

$$\begin{array}{r} 0.4 \\ \times 0.2 \\ \hline 0\ 8 \\ 0\ 0\ 0 \\ \hline 0\ 0\ 8 \end{array}$$

Say, "We know from using the squared material that the product is 8 hundredths. Where would we place the decimal point in the product so it would represent 8 hundredths? (We would place the decimal point between the zeros.) There is a shortcut we can use so we will always know where to place the decimal point in the product. How many digits are to the right of both decimal points in the factors? (A total of two digits are to the right of the decimal points in the factors.) Then we will have a total of two digits to the right of the decimal point in the product. Using this shortcut, where will we place the decimal point?" (We will still place it between the zeros.) Ask a student to place the decimal point in the product on the chalkboard as the other students do the same in their notebooks.

e.g.,

$$\begin{array}{r} 0.4 \\ \times 0.2 \\ \hline 0\ 8 \\ 0\ 0\ 0 \\ \hline 0.0\ 8 \end{array}$$

Say, "What is the product?" (The product is 0.08.)

Repeat this procedure with other examples having decimal factors to tenths.

**STRATEGY 1:** cont'd

e.g.,

$$\begin{array}{r} 1.1 \\ \underline{\times\ \ 4} \end{array} \qquad \begin{array}{r} 0.6 \\ \underline{\times 0.5} \end{array} \qquad \begin{array}{r} 2.3 \\ \underline{\times 0.2} \end{array}$$

**STRATEGY 2:** Prepare and display a multiplication example having decimal factors to tenths.

e.g.,

$$\begin{array}{r} 0.6 \\ \underline{\times 0.3} \end{array}$$

Say, "In what other way can a decimal be written? (A decimal can also be written as a fraction.) We will use what we know about multiplying fractions to learn about multiplying decimals. We will use the fraction equivalents of the decimal factors to solve this example." Ask a student to rewrite the example on the chalkboard, expressing the factors as fractions, as the other students write both examples in their notebooks.

e.g.,

$$\begin{array}{r} 0.6 \\ \underline{\times 0.3} \end{array} \qquad \frac{3}{10} \times \frac{6}{10} = \boxed{\phantom{00}}$$

Ask a student to read both examples aloud. Say, "When we multiply fractions, what word can we use in place of the multiplication sign? (We can say the word "of" in place of the multiplication sign.) How can we read the fraction example? (We can say $\frac{3}{10}$ of $\frac{6}{10}$.) Will the product be greater than or less than either factor? (The product will be less than either factor because we are finding a part of a factor.) How do we multiply fractions?" (We multiply the numerators and then we multiply the denominators.) Ask a student to solve the fraction example at the chalkboard as the other students solve it in their notebooks.

e.g., $\frac{3}{10} \times \frac{6}{10} = \frac{18}{100}$

**STRATEGY 2:** cont'd

Say, "What is the product? (The product is $\frac{18}{100}$.) Since the factors in the fraction example are equivalent to the factors in the decimal example, the products will also be equivalent." Ask a student to write the decimal equivalent of $\frac{18}{100}$ on the chalkboard, e.g., 0.18.

Say, "We know the product of the decimal example. Now let's see if we can arrive at this answer by solving the decimal example. We multiply decimals the same way we multiply whole numbers. However, we must place the decimal point in the product." Ask a student to solve the example at the chalkboard as the other students solve it in their notebooks.

e.g.,

$$\begin{array}{r} 0.6 \\ \underline{\times 0.3} \\ 1\ 8 \\ \underline{+0\ 0\ 0} \\ 0\ 1\ 8 \end{array}$$

Say, "We know from solving the equivalent fraction example that the product is 18 hundredths. Where should we place the decimal point in the product so it will also be 18 hundredths? (We should place the decimal point between the 0 and the 1.) There is a shortcut for correctly placing the decimal point when multiplying decimals. We can count the number of digits to the right of both decimal points in the factors. How many digits, in all, are to the right of the decimal points in the factors? (A total of 2 digits are to the right of the decimal points.) Therefore, we must have two digits to the right of the decimal point in our product. Using this shortcut, where will we place the decimal point in the product?" (We will place it between the 0 and the 1.) Ask a student to place the decimal point in the product on the chalkboard as the other students do the same in their notebooks.

**4.07.04**

**STRATEGY 2:** cont'd

e.g.,

$$\begin{array}{r} 0.6 \\ \underline{\times 0.3} \\ 1\ 8 \\ \underline{0\ 0\ 0} \\ 0.1\ 8 \end{array}$$

Say, "What is the product?" (The product is 0.18)

Repeat this procedure multiplying other decimals to tenths.

**4.07.04.02** **divide decimals with dividends to tenths by whole number divisors**

**STRATEGY 1:** Prepare and distribute squared material (hundreds and tens) to each student or group of students. Say, "Look at the large squares. Each large square is equal to one whole unit. How many strips does it take to make one whole unit? (It takes 10 strips to make one whole unit.) If the square is equal to one whole unit, what name can we give to a strip? (It equals one tenth.) How can we show 8.4?" (We can use 8 squares and 4 strips.)

Write the following example on the chalkboard:

$$2\overline{)8.4}$$

Say, "How do we read this example? (We read this example as 8 and 4 tenths divided by 2.) Divide the squared material into 2 equal groups. How much is in each group? (We have 4 squares and 2 strips in each group.) What number does that represent?" (4 squares and 2 strips represent 4 and 2 tenths.) Pointing to the example on the chalkboard, say, "We will see how we can get the same answer by solving this example. When you divided the 8 into two equal groups, how many were in each group?" (4 were in each group.) Ask a student to write 4 in the ones place in the quotient as the other students do the

**STRATEGY 1:** cont'd

same in their notebooks. Say, "When you divided 4 tenths into two equal groups, how many tenths were in each group?" (There were 2 tenths in each group.) Ask a student to write 2 in the tenths place in the quotient as the other students do the same in their notebooks. Say, "Place the decimal point in the quotient directly above the decimal point in the dividend. Read the quotient. (The quotient is 4 and 2 tenths.) This is the same answer as when we divided the squared material. How can we check our quotient?" (We can multiply the quotient by the divisor. The result should be the dividend.) Ask a student to show the check at the chalkboard as the other students work in their notebooks.

e.g.,

$$\begin{array}{r} 4.2 \\ \times\ 2 \\ \hline 8.4 \end{array}$$

Repeat this procedure using other examples.

**STRATEGY 2:** Write the following division example on the chalkboard:

$$3\overline{)21.9}$$

Ask the students to write it in their notebooks. Say, "How do we read this example? (The example says 21 and 9 tenths divided by 3.) Before we try to solve the example, let's estimate to see about how much our quotient will be. How should we estimate this quotient? (21.9 is close to 22. We should find the quotient for 22 ÷ 3.) About how much will the quotient be? (21 ÷ 3 is 7, so our answer will probably be a little more than 7.) When we divide a decimal by a whole number, the first thing we do is place the decimal point in our quotient. The decimal point in the quotient is placed directly above the decimal point in the dividend. We can then divide as we would with any whole number." Ask a student to

**STRATEGY 2:** cont'd

place the decimal point in the quotient as the other students write it in their notebooks.

Say, "Now we can solve the example as we would with whole numbers." Ask a student to solve the example at the chalkboard as the other students solve it in their notebooks.

e.g.,

$$\begin{array}{r} 7.3 \\ 3\overline{)21.9} \end{array}$$

Say, "What is the quotient? (The quotient is 7.3.) Is this answer reasonable? Explain. (It is reasonable because it is close to our estimate of a little more than 7.) How can we check our quotient?" (We can check by using multiplication.) Ask a student to write the check on the chalkboard as the other students write it in their notebooks.

e.g.,

$$\begin{array}{r} 7.3 \\ \underline{\times\quad 3} \\ 21.9 \end{array}$$

Repeat this procedure using other examples.

**4.07.04.03** **solve word problems related to skills learned in this module.**

**STRATEGY 1:** Prepare and display a word problem.

e.g.,

> My two numbers, if added, have a sum of 1. If multiplied, they have a product of 0.24 What are my numbers?

Say, "What do we have to find? (We must find two numbers with a sum of 1 and a product of 0.24.) What strategy can we use to find the numbers? (We can use a guess and check strategy.) How do you think we should begin? (We should choose two numbers with a sum of 1.) What kind of numbers could they be? (They could be fractions, decimals, or whole

**STRATEGY 1 cont'd**

numbers.) Should we just begin choosing numbers or is there another strategy which might help us?" (We could make a list of possible answers.)

Ask a student to come to the chalkboard and list the numbers suggested by his/her classmates as the other students write the list into their notebooks.

| Number | Sum | Product |
|---|---|---|
| 0, 1 | 1 | 0 |
| 0.1, 0.9 | 1 | 0.09 |
| 0.2, 0.8 | 1 | 0.16 |
| 0.3, 0.7 | 1 | 0.21 |
| 0.4, 0.6 | 1 | 0.24 |

Say, "Which pair of numbers has a sum of 1 and a product of 0.24? (The numbers are 0.4 and 0.6.) Are there any others?" (No, those are the only numbers.)

Repeat this procedure with similar problems.

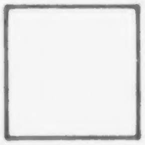
**STRATEGY 2:** Prepare and display a word problem.

e.g.,

The perimeter of Karen's room is 36.8 feet. The room is square. How long is each side of the room?

Say, "What are we asked to find? (We must find the length of each side of Karen's room.) What information does the problem give us? (The problem says that the perimeter is 36.8 feet and the room is square.) How does it help us to know that the room is square? (We know that all four sides are the same length.) How can we begin to solve this problem?" (We can draw a picture of the room.) Ask a student to draw a picture of the room on the chalkboard.

e.g.,



Karen's room
Perimeter = 36.8 feet

**STRATEGY 2:** cont'd

Say, "Look at the picture. We know that the perimeter is 36.8 feet. How can we find the length of each side?" (We can divide by 4.) Ask a student to write and solve the example on the chalkboard as the other students solve it in their notebooks.

e.g.,

$$\begin{array}{r} 9.2 \\ 4\overline{)36.8} \end{array}$$

Say, "What is the quotient? (The quotient is 9.2.) What is the answer to the problem? (Each side of Karen's room is 9.2 feet long.) How can we check our answer?" (We can multiply 9.2 by 4 or add 9.2 + 9.2 + 9.2 + 9.2.) Ask a student to check the answer on the chalkboard as the other students check it in their notebooks.

e.g.,

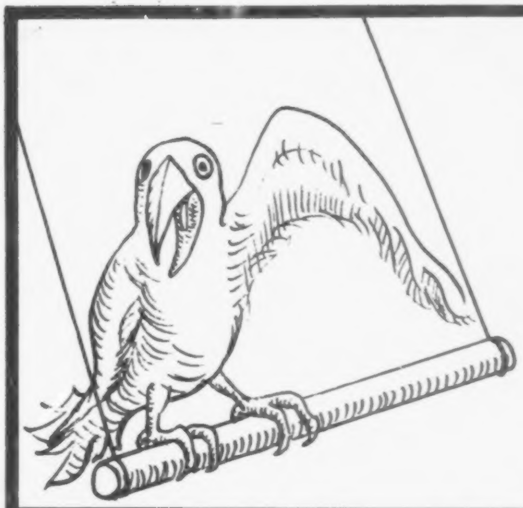
| check | check |
|---|---|
| 9.2 feet | 9.2 feet |
| x 4 | 9.2 feet |
| 36.8 feet | 9.2 feet |
| | +9.2 feet |
| | 36.8 feet |

Repeat this procedure with other word problems.

P.O. 4.07.04.01

NAME: ______________________ CLASS: __________ DATE: ________

Multiply. Use the key to solve the riddle.



What is another name for a parrot?

A

W___ ___ ___ ___ ___
1 2 3 4 5

___ ___ ___ ___ ___
6 7 8 9 10

| | | | | |
|---|---|---|---|---|
| ①<br>0.6<br>×0.4<br>.24 | ②<br>1.7<br>×0.6 | ③<br>1.6<br>×0.7 | ④<br>0.9<br>×0.6 | ⑤<br>7.4<br>×0.2 |
| ⑥<br>7.1<br>×0.8 | ⑦<br>1.2<br>×0.8 | ⑧<br>5.6<br>×0.2 | ⑨<br>1.8<br>×0.3 | ⑩<br>3.7<br>×0.4 |

| Key | B | D | I | O | R | W | Y |
|---|---|---|---|---|---|---|---|
| | 5.68 | 0.54 | 0.96 | 1.02 | 1.12 | 0.24 | 1.48 |

Do you remember?

| | | |
|---|---|---|
| check | check | check |
| 10,000<br>- 478 | 40,000<br>- 1,262 | 200,000<br>- 38,918 |

P.O. 4.07.04.02

NAME:________________ CLASS:__________ DATE:________

Solve and check the examples below.

| | |
|---|---|
| ① **check**<br>$6\overline{)30.6}$ | ② **check**<br>$2\overline{)48.6}$ |
| ③ **check**<br>$4\overline{)28.4}$ | ④ **check**<br>$9\overline{)63.9}$ |
| ⑤ **check**<br>$4\overline{)1.6}$ | ⑥ **check**<br>$5\overline{)51.5}$ |
| ⑦ **check**<br>$7\overline{)57.4}$ | ⑧ **check**<br>$8\overline{)26.4}$ |

P.O. 4.07.04.03

NAME: ______________________ CLASS: __________ DATE: ________

Solve the word problems below.

① At a ribbon cutting ceremony for a new Hall of Science, the mayor cut an 11.4 ribbon into 2 pieces exactly the same length. How long was each piece?

**solve** **check**

Each piece was _____ long.

② A space exhibit had 5 moon rocks. Each rock weighed 7.4 kilograms. What was the total weight of the moon rocks in the exhibit?

**solve** **check**

There were _____ kilograms of moon rocks in the exhibit.

③ A certain dinosaur's bones weighed 402.3 pounds. They had to be shipped in 3 crates. If all 3 crates were equal in weight, how many pounds of bones were in each?

**solve** **check**

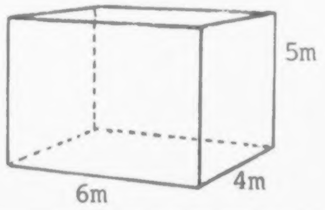
There were _____ pounds of dinosaur bones in each crate.

④ One very large space rock originally weighed 22.2 kilograms. It was cut into 3 equal pieces for the exhibit. How much did each piece weigh?

**solve** **check**

Each piece weighed _____ kilograms.

Do you remember?



Find the volume of the box below.

Volume = ___________

674

Unit 63

## 4.01.07 PATTERNS IN NUMERATION

(2-3 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.01.07.01A find patterns in a sequence of numbers and complete the sequence;

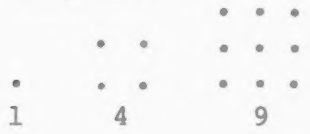
e.g.,

3,7,11,__,__,__,27

4.01.07.02B find patterns for square numbers;

e.g.,

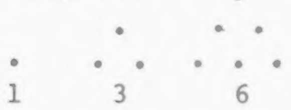
Continue the following sequence of dot diagrams through the next two diagrams.



4.01.07.03B find patterns for triangular numbers.

e.g.,

Continue the following sequence of dot diagrams through the next two diagrams.



## VOCABULARY

**TERMS**

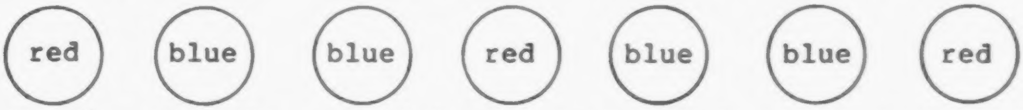
sequence
series
patterns
rule

---

## GETTING STARTED 1:

Prepare and display a pattern using colored chips or cubes.

e.g.,



Say, "What color chip do you think will come next? (A blue chip will follow the red chip.) How can you tell that a blue chip will come after the red chip?" (The first color in the pattern is red. Blue comes after the red chip.) Ask the students to predict the next color in order to complete another sequence of the pattern. Repeat this procedure with other patterns of colored chips or cubes, including those created by the students. Ask the students to verbally describe the patterns.

---

## GETTING STATRED 2:

Prepare the following chart on the chalkboard to play Guess my Rule:

| First Number | Second Number |
|---|---|
| 2 | 4 |
| 8 | 16 |
| 3 | 6 |
| 5 | |
| 7 | |
| 9 | |
| 12 | |

Say "In this game you must discover the rule which is applied to each First Number in order to get the Second Number. Once you guess the rule you can complete the pattern. Do the Second Numbers get larger or smaller? (They get larger.) What two operations are possible if the Second Numbers get larger? (Only addition and multiplication are possible.) What can we do to 2 in order to get 4? (We can either add 2 or multiply by 2.) Which rule would also work for the next two numbers? (Only multiplying by 2 works.) Now that you have guessed the rule, you can complete the pattern." Ask the students to take turns filling in the missing numbers and to verbalize the reasons for their choices.

**4.01.07**

**4.01.07.01** **find patterns in a sequence of numbers and complete the sequence**

**STRATEGY 1:** Write a number sequence on the chalkboard.
e.g.,
25, 22, 19, __, __, __, 7

Say, "In order to fill in the missing numbers, we need to discover the pattern shown by the numbers. The same rule is applied to each number to get the next number. As we read the numbers, do they get larger or smaller? (They get smaller.) What operations are possible to give a smaller number? (Subtraction and division are possible.) Look at the beginning of the number series. What could we do to 25 so that the answer is the next number, 22? (We could subtract 3 or count backward by 3.) Will that work to go from 22 to 19? (Yes.) Then you have discovered the pattern." Ask a student to fill in the missing numbers based on the pattern. Say, "What is the rule for this pattern? (The rule is to subtract 3 or count backward by 3 to go from one number to the next.)

Repeat this procedure using other number patterns with different operations. Include number patterns with two operations.
e.g.,
2, 4, 3, 6, 5, __, __, __, 17, 34
Pattern: multiply by 2, subtract 1

Ask the students to verbally describe the number patterns and to complete them in their notebooks. As a variation, students may create number sequences for their classmates to complete.

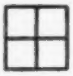
**4.01.07.02** **find patterns for square numbers**

**STRATEGY 1:** Prepare and distribute 25 squares (units pieces from squared material) to each student or group of students. Ask the students to show the number 1 using one square. Write 1 on the chalkboard. Say, "Add 3 squares to the one displayed to make a group

**STRATEGY 1:** cont'd

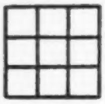
of 4 squares. Do it in such a way that there will be 2 rows of 2 squares." Demonstrate.

e.g.,



Write the number 4 on the chalkboard. Say, "What do you notice about the shape of the figure made by the 4 squares? (The shape is a square.) Now add 5 more small squares to your large square so that you will have 3 rows of 3 small squares each.

e.g.,



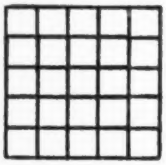
Say, "What do you notice about the 9 small squares?" (They form a larger square. There are the same number of small squares across and down.) Write the numeral 9 on the chalkboard.

Continue this procedure to make a large square formed by 16 small squares.

Say, "We call these numbers square numbers. Why do you think 1, 4, 9, and 16 are called square numbers?" (We can make the number of items represented by these numerals into the shape of a square.)

Ask the students to predict and demonstrate the pattern for the next square number.

e.g.,



Say, "What is the next square number? (It is 25.) How are square numbers, such as 1, 4, 9, 16, and 25 alike? (The number of items represented by these numbers can be arranged into square shapes.)
If we think of these squares as arrays, what array do the 25 small squares represent?" (They represent an

**STRATEGY 1:** cont'd

array which demonstrates the product of 5 times 5.) Repeat this procedure for 16, 9, 4, and 1. Say, "What do you notice about some of the factors of square numbers? (Square numbers have a pair of factors that are equal.) Do you think 100 is a square number? Explain." (100 is a square number because it has a pair of equal factors, 10 times 10. Therefore, a square array can be made to represent 100.)

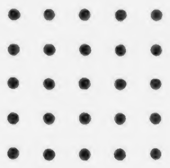
**STRATEGY 2:**

Write the following examples on the chalkboard:

1 x 1 = ☐   2 x 2 = ☐   3 x 3 = ☐   4 x 4 = ☐   5 x 5 = ☐

Ask several students to write the products on the chalkboard. Say, "We can draw arrays to represent these products. How will we draw an array to show 5 x 5? (We will draw an array with 5 rows and 5 columns.) How many dots in all will we use?" (We will use 25 dots.) Ask a student to draw this array on the chalkboard.

e.g.,

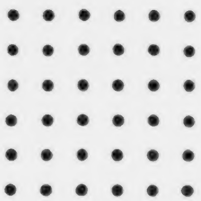


Repeat this procedure by drawing arrays for the remaining examples. Say, "What is the shape of each array? (Each array forms a square pattern.) What did you notice about each pair of factors in all the examples we used? (The two factors were the same in each example.) When we multiply like factors, the product can be represented by a square array. We call these special products square numbers. If the factors are not the same, what shape do you think the array will be? (It will be rectangular because the rows and columns will be different in size.) What do you think the next square number will be?" (It will be 36, the product of 6 times 6.) Ask a student to draw the array for 6 x 6.

**4.01.07**

**STRATEGY 2:** cont'd

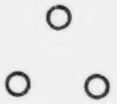
e.g.,



Say, "How can we always identify a square number?" (It is a number with a pair of like factors.)

**4.01.07.03** **find patterns for triangular numbers**

**STRATEGY 1:** Prepare and distribute a supply of chips or gummed circles to each student or group of students. Say, "Place 1 chip in the middle of your desk." Draw a representation of the chip on the chalkboard. Next to it, write the numeral 1. Add two more circles to the representation on the chalkboard in the following way:

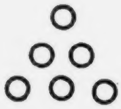


1

Ask the students to do the same using their chips. Say, "How many chips did we start with? (We started with 1 chip.) How many more chips did we add? (We added 2 more chips.) How many chips are there in all?" (There are 3 chips in all.) Next to the second row of circles on the chalkboard write: 1 + 2 = 3.

Say, "If we traced around the shape formed by your 3 chips or my 3 circles, what shape would we have? (We would have a triangle.) 1 and 3 are called triangular numbers because they can be represented in a triangular shape." Draw 3 more circles in the next row on the chalkboard and ask the students to do the same with their chips.

e.g.,



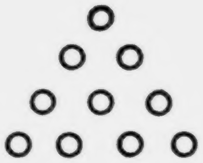
1

1 + 2 = 3

**STRATEGY 1**
cont'd

Say, "How many chips did we add? (We added 3 more chips.) How many chips are there in all?" (There are 6 chips in all.) Next to the third row write: 1 + 2 + 3 = 6. Say, "If we traced around your chips or my circles, what shape would we have? (We would have a triangle.) Therefore, 6 is also a triangular number. With how many chips did we start? (We started with 1 chip.) How many did we place in the next row to form the next triangular number? (We placed 2 more chips, for a total of 3.) How many chips did we place in the third row to form the next triangular number? (We placed 3 more chips, for a total of 6.) Following this pattern, how many chips do you think we should place in the fourth row to make the next triangular number?" (We should place 4 chips in the next row.) Ask the students to do this as you draw the circles in the fourth row on the chalkboard.

e.g.,

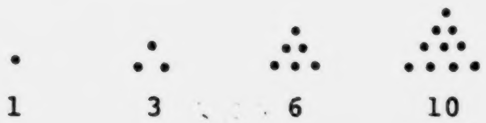


1
1 + 2 = 3
1 + 2 + 3 = 6

Say, "Did you form a larger triangle? (Yes.) How many chips do you have in all? (I have 10 chips in all.) 10 is a triangular number." Next to the fourth row of circles on the chalkboard write: 1 + 2 + 3 + 4 = 10. Ask a student to read aloud, and circle at the chalkboard, all the triangular numbers created so far.

Repeat this procedure by having the students discover the next several triangular numbers, e.g., 15, 21, 28 ...

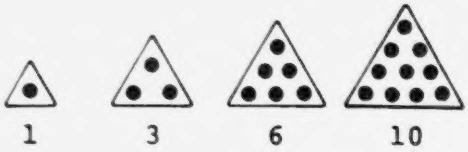
**STRATEGY 2:** Display the following diagrams on the chalkboard:



**STRATEGY 2:** cont'd

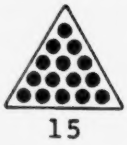
Say, "What do the numbers below the dots represent? (They represent the number of dots in each group.) What shape are the groups of 3, 6, and 10 dots? (They form triangles.) Could we draw a triangle around the one dot?" (Yes.) Ask a student to draw a triangle around each group of dots.

e.g.,



Say, "What pattern do you notice about these groups of dots? (The first group has 1 row, the second group has 2 rows, the third group has 3 rows, and the fourth group has 4 rows.) Does anyone see another pattern? (Row 1 has 1 dot, row 2 has 2 dots, row 3 has 3 dots, ...) If we were to continue this pattern, what would the next group of dots look like?" (It would have 5 rows. Row 1 would have 1 dot, row 2 would have 2 dots, ..., row 5 would have 5 dots.) Ask a student to draw this group of dots on the chalkboard. Say, "How many dots are there in all in this group?" (There are 15 dots in all.) Ask a student to write the numeral 15 below the dots.

e.g.,



Ask a student to read the numerals below the groups of dots. Say, "These numerals are called triangular numbers because we can represent them in a triangular shape. What do you think will be the next triangular number? (The next triangular number will be 21.) How do you know?" (For the sixth row I will draw 6 dots. The first 5 rows have 15 dots. 15 plus 6 equals 21.)

Repeat this procedure to explore the next several triangular numbers.

P.O. 4.01.07.01

NAME: ________________ CLASS: ________ DATE: ________

Complete each pattern. Write the rule.

There may be more than one operation in each series.

18, 15, 12, 9, $\boxed{6}$, $\boxed{3}$

Rule: subtract 3

2, 4, 3, 6, 5, $\boxed{10}$, ☐, ☐, ☐

Rule: multiply by 2, subtract 1

3, 6, 12, 24, ☐, ☐, ☐

Rule: ________________

5, 7, 9, 11, ☐, ☐, ☐

Rule: ________________

7, 9, 6, 8, 5, 7, ☐, ☐, ☐, ☐

Rule: ________________

**CHALLENGE!** Make up your own pattern. Write the rule.

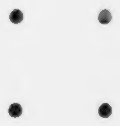
☐, ☐, ☐, ☐, ☐

Rule: ________________

P.O. 4.01.07.02

NAME: ____________________ CLASS: __________ DATE: ________

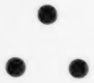
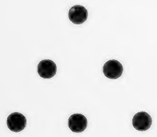
Follow the pattern to make the next three square arrays.
Write the square numbers.

| Array | Square Number |
|---|---|
| | 1 |
|  | 4 |
| | |
| | |
| | |
| | |

P.O. 4.01.07.03

NAME: ______________________ CLASS: __________ DATE: ________

Follow the pattern to make the next four triangular shapes.
Write the triangular numbers.

| Triangular Shapes | Triangular Numbers |
|---|---|
| | 1 |
|  | 3 |
|  | |
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Unit 64

## 4.01.08 PLACE VALUE THROUGH HUNDRED MILLIONS

(2-3 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.01.08.01A identify place value through millions;

e.g.,

| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|---|---|---|---|---|---|---|
| 7 | 6 | 3 | 1 | 0 | 2 | 4 |

4.01.08.02B identify place value through hundred millions;

e.g.,

| hundred millions | ten millions | millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|---|---|---|---|---|---|---|---|---|
| 9 | 8 | 7 | 6 | 3 | 1 | 0 | 2 | 4 |

4.01.08.03B identify and write 7-, 8-, and 9-digit numbers in expanded form;

e.g.,

7,532,468 = 7,000,000 + 500,000 + 30,000
+ 2,000 + 400 + 60 + 8

| | |
|---|---|
| 4.01.08.04B | identify and write 7-, 8-, and 9-digit numbers in standard form when given the expanded form;<br>e.g.,<br>4,000,000 + 300,000 + 50,000<br>+ 3,000 + 200 + 40 + 6 = 4,353,246 |
| 4.01.08.05B | translate a verbal phrase into a numeral and a numeral into a verbal phrase.<br>e.g.,<br>six million three hundred forty two =<br>6,000,342<br><br>2,543,721 = two million, five hundred forty-three thousand, seven hundred twenty-one |

**4.01.08**

## VOCABULARY

### TERMS

millions
ten millions
hundred millions
verbal

---

### GETTING STARTED 1:

Say, "We have learned to identify the place value of the digits in large numbers." On the chalkboard write: 16,294. Ask a student to read the numeral aloud. Say, "What is the value of the digit 9 in this numeral?" (The digit 9 is in the tens place. Therefore, it has a value of 90.)

Extend this activity to larger numbers through hundred thousands. Say, "Can you think of a way to make our identification of the place value of the digits in large numerals easier to read?" (Yes, we can make it easier by using a place value chart.) Ask the students to name the places through hundred thousands as you write them on the chalkboard.

e.g.,

| Hundred Thousands | Ten Thousands | Thousands | Hundreds | Tens | Ones |
|---|---|---|---|---|---|
| | | | | | |

Write a numeral on the chalkboard, e.g., 254,318. Ask a student to write it on the place value chart. Indicate a specific digit and ask a student to tell the value of that digit.

Repeat this procedure until each student has had a chance to participate. Say, "What do you notice about each place value as we move from right to left on the place value chart?" (Each place value is ten times greater than the place before as we move from right to left on the place value chart.)

## ETTING STARTED 2:

Say, "We have learned how to write numbers as numerals in standard form and expanded form." Write a numeral on the chalkboard in standard form, e.g., 62,568. Ask a student to read it aloud. Ask another student to write the numeral in expanded form on the chalkboard as the other students write it in their notebooks.

e.g., 62,568 = 60,000 + 2,000 + 500 + 60 + 8

Repeat this procedure using numerals through hundred thousands.

Write a numeral in expanded form on the chalkboard.

e.g., 30,000 + 200 + 20 + 8 = ☐

Ask a student to write it in standard form on the chalkboard as the other students write it in their notebooks, e.g., 30,228. Say, "How can we always make sure we will correctly write an expanded numeral in standard form?" (We can write the parts of the expanded numeral in a column and add.) Ask a student to demonstrate this at the chalkboard.

e.g.,

$$\begin{array}{r} 30{,}000 \\ 200 \\ 20 \\ +\quad 8 \\ \hline 30{,}228 \end{array}$$

Say, "What place is not represented in the expanded form of this number? (The thousands place in not represented in the expanded form.) Why?" (There is a zero in the ten thousand place.)

Repeat this procedure using numerals through hundred thousands.

**4.01.08**

**4.01.08.01** **identify place value through millions**

**STRATEGY 1:** Prepare and display a place value chart through hundred thousands. Ask the students to read aloud the names of the places in increasing order. Say, "What do we know about place value as we move from right to left on the place value chart? (As we move from right to left, each place is ten times greater than the place before.) If we were to move one place to the left of the hundred thousands, that place would be ten times greater than hundred thousands. We call that place millions." To the left of the hundred thousands on the chart, write: millions. Say, "One million is ten times greater than one hundred thousand."

Label the periods on the chart using the words units, thousands, and millions. Ask a student to place a 1 in the millions column on the place value chart. Say, "To represent 1 million, what should we write in the remaining columns?" (We will write zeros in the remaining columns.) Ask a student to write the zeros on the chart.

e.g,

| Millions | | | Thousands | | | Units | | |
|---|---|---|---|---|---|---|---|---|
| Hundred Millions | Ten Millions | Millions | Hundred Thousands | Ten Thousands | Thousands | Hundreds | Tens | Ones |
| | | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

On the chalkboard write: 1000000. Say, "When we write large numerals, we use commas to help us read them. Where should we place a comma in the numeral on the chalkboard?" (We should place a comma between the zero in the hundreds place and the zero in the thousands place.) Ask a student to place the comma in the numeral on the chalkboard. Say, "We will

**4.01.08**

**STRATEGY 1:** cont'd

also place a comma between the zero in the hundred thousands place and the one in the millions place." Ask a student to place this comma in the numeral, one million.

On the chalkboard write: 2,359,681. Pointing to the first comma say, "We read this comma as the word million." Pointing to the second comma say, "We read this comma as the word thousand." Ask a student to read the numeral aloud and to write it on the place value chart as the other students write it in their notebooks. Say, "What is the value of the digit 5 in this numeral?... the digit 2? ... the digit 9? ..." (The 5 means 50,000... 2 means 2,000,000 ... 9 means 9,000 ...)

Repeat this procedure using other 7-digit numerals.

**4.01.08.02** **identify place value through hundred millions**

**TRATEGY 1:** Adapt Strategy 1, P.O. 4.01.08.01.

**4.01.08.03** **identify and write 7-, 8-, and 9- digit numbers in expanded form**

**STRATEGY 1:** Prepare and display a place value chart through hundred millions.

e.g.,

| Millions | | | Thousands | | | Units | | |
|---|---|---|---|---|---|---|---|---|
| Hundred Millions | Ten Millions | Millions | Hundred Thousands | Ten Thousands | Thousands | Hundreds | Tens | Ones |
| | | | | | | | | |

**4.01.08**

**STRATEGY 1:** cont'd

On the chalkboard write: 5,243,876. Ask the students to read the numeral aloud and write it in their notebooks. Say, "Which digit is in the hundreds place?... thousands place?... millions place?..." (The digit 8 is in the hundreds place ... 3 is in the thousands place... 5 is in the millions place...) To write this numeral in expanded form, what do we have to know? (We have to know the value of each digit.) How will writing the numeral on the place value chart help us?" (When we write the numeral on the place value chart it is easy to see the value of each digit.)

Ask a student to write the numeral on the place value chart. Say, "Which digit has the greatest value?" (5 has the greatest value, it means 5 million.) Ask a student to write that value on the chalkboard, e.g., 5,000,000. Place a plus symbol after 5,000,000 and ask a student to write the value of the next digit, 2.
e.g.,

5,000,000 + 200,000

Continue this procedure until the entire numeral is written in expanded form. Ask the students to read it aloud and write it in their notebooks.

Repeat this procedure using other 7-, 8-, and 9-digit numerals.

**4.01.08.04** **identify and write 7-, 8-, and 9-digit numbers in standard form when given the expanded form**

**STRATEGY 1:** Say, "When you were very young you learned nursery rhymes. Who remembers the rhyme, Humpty Dumpty?" Ask a student to say the rhyme.

**STRATEGY 1:** e.g.,
cont'd

Humpty Dumpty sat on a wall.
Humpty dumpty had a great fall.
All the king's horses and all the king's men
Couldn't put Humpty Dumpty together again!

Say, "Today we are going to put Humpty Dumpty together again. We are going to pretend that Humpty Dumpty was a large number. What happened when Humpty Dumpty fell off the wall?" (He broke up into different parts.) Write an expanded numeral on the chalkboard.

e.g.,

4,000,000 + 300,000 + 50,000 + 3,000 + 200 + 40 + 6

Say, "Here is a numeral that is written in parts. What do we call this form of a numeral? (It is the expanded form.) How can we put this broken or expanded numeral back together again? (We can add all the parts together.) Can you add them in the horizontal format?" (We can, but it is easier to add them vertically.) Ask a student to add at the chalkboard as the other students add in their notebooks.

e.g.,

$$\begin{array}{lr} & 4{,}000{,}000 \\ & 300{,}000 \\ & 50{,}000 \\ & 3{,}000 \\ & 200 \\ & 40 \\ + & 6 \\ \hline & 4{,}353{,}246 \end{array}$$

Say, "What is the standard form of this numeral?" (The standard form is 4,353,246.)
Repeat this procedure using the expanded form of other large numbers.

**STRATEGY 2:** Prepare and display a place value chart through hundred millions. (See Strategy 1, P.O. 4.01.08.03.) On the chalkboard write: 3,000,000 + 200,000 + 50,000 + 2,000 + 500 + 30 + 8. Ask the students to write it in their notebooks. Say, "What do we call this form of a numeral? (It is the expanded form.) How can we find the standard form of the numeral? (We can add all the parts together.) How might the place value chart help us to find the standard form without adding? (We can write a digit in each place value column to represent each part of the numeral.) How will we repesent 3,000,000 on the place value chart?" (We can write a 3 in the millions place.) Ask a student to write a 3 in the millions place on the place value chart. Repeat this procedure for each part of the expanded numeral.

When the numeral is complete on the place value chart say, "If we write the numeral as it appears on the place value chart, it will be in standard form." Ask a student to write the numeral from the chart onto the chalkboard as the other students write it in their notebooks. Remind the students to use commas in the appropriate places.

e.g.,

3,252,538

Repeat this procedure using other 7-, 8-, and 9-digit numerals in expanded form.

**4.01.08.05** **translate a verbal phrase into a numeral and a numeral into a verbal phrase**

**STRATEGY 1:** Write the verbal form of a large number on the chalkboard.

e.g.,

four million, three hundred twenty-three thousand, three hundred sixteen

**STRATEGY 1:** cont'd

Ask the students to read it aloud and to write it in their notebooks. Say, "We will learn to translate these words into the standard form of the numeral they represent. To do that, it is helpful to know what the greatest place value will be. Also, the commas in the phrase can help us separate the number into the millions, thousands, and units periods. What is the greatest place value needed to write this numeral? (The greatest place value needed is millions.) How do you know? (Up to the first comma, we say, four million.) If a numeral starts with the millions place, how many digits will it have?" (It will have 7 digits.) On the chalkboard draw seven dashes to represent the seven digits.

e.g.,

_ _ _ _ _ _ _

Say, "We know the numeral will have 7 digits. Before we write the numeral let's place the commas so the number will be easier to write." Ask a student to place the commas in the appropriate places between the dashes.

e.g.,

_, _ _ _, _ _ _

Say, "Since four million is the greatest digit, we will write the 4 in the millions place. Which dash represents the millions place?" (The first dash on the left represents millions.) Ask a student to write the 4 in the appropriate place.

e.g.,

4, _ _ _, _ _ _

Say, "Remember, the commas in the word form of a number separate the periods just as the commas in the standard form do. After the words 'four million',

**STRATEGY 1:**
cont'd

what is in the thousands period? (There are three hundred twenty-three thousands.) We will write this in the thousands period in the numeral." Ask a student to write three hundred twenty-three in the thousands period at the chalkboard.

e.g.,

4, 3 2 3, _ _ _

Repeat this procedure to write the last part of the numeral, 316. Ask a student to read the numeral aloud. Say, "We read the numeral form and the word form the same way." Ask the students to write the numeral in their notebooks.

Say, "We can also write the word form if we can read the standard form." On the chalkboard write the following: 5,270,116. Ask a student to read the numeral aloud. Say, "To write this numeral in words, we must write exactly what you just said. How do we read the numeral up to the first comma." (We say five million.) Next to the number write: = five million. Say, "We place commas in the word form just as we do in the numeral form." Place a comma after the words "five million."

Say, "Read the next part of the numeral up to the next comma." (Two hundred seventy-thousand) Write "two hundred seventy thousand" after "five million," on the chalkboard. Continue this procedure until the word form of the numeral is complete. Ask the students to write the numeral and its word form in their notebooks.

Repeat this procedure using other large numerals.

P.O. 4.01.08.01

NAME: ____________________ CLASS: __________ DATE: ________

Study the chart below. Use the information on the chart to help you answer the questions.

**1980 Population of the Boroughs of New York City**

| Borough | Population |
|---|---|
| Bronx | 1,168,972 |
| Brooklyn | 2,230,936 |
| Manhattan | 1,428,285 |
| Queens | 1,891,325 |
| Staten Island | 351,121 |

1. Look at the population of Manhattan.

   The digit in the thousands place is ________.

   The digit in the millions place is ________.

   The digit in the hundred thousands place is ________.

2. Look at the population of Brooklyn.

   The digit in the ten thousands place is ________.

   The digit in the hundreds place is ________.

   The digit in the millions place is ________.

3. Which Borough's population has an 8 in the hundred thousands place?

   ____________________

4. The population of the Bronx was ____________ in 1980.

   In this number, the 9 represents ____________ and the 6 represents ____________.

5. The population of Staten Island was ____________ in 1980.

   In this number, the 3 represents ____________ and the 2 represents ____________.

P.O. 4.01.08.02

NAME:________________________ CLASS:__________ DATE:________

See how we grew! Study the chart. Use the information on the chart to answer the questions.

**1984 Population of Countries around the World**

| Country | Population |
|---|---|
| Brazil | 134,386,123 |
| Canada | 25,142,654 |
| India | 746,388,512 |
| United States | 236,690,153 |

1. Look at the population of the United States.

   The digit in the millions place is __________.
   The digit in the hundred millions place is __________.

2. Which country has a population greater than 5 hundred million? ______________________________

3. In 1984, the population of Brazil was 134,386,123. Draw a ring around the digit that represents 30,000,000.

4. In 1984, the population of Canada was 25,142,654. In this number, the 6 represents ____________________ and the 1 represents ____________________.

5. Which country's population has a 2 in the ten millions place?

   ________________________________________

Do you remember?

| | | |
|---|---|---|
| check | check | check |
| 3)\$4.26 | 5)\$5.15 | 2)\$8.44 |

P.O. 4.01.08.03-.04

NAME: ____________ CLASS: ________ DATE: ________

Follow the directions below.

I. Write each numeral below in expanded form.

35,467,121 = ____________________

1,180,267 = ____________________

537,286,005 = ____________________

46,500,296 = ____________________

279,381,666 = ____________________

II. Write the standard numeral for each expanded numeral below.

3,000,000 + 500,000 + 20,000 + 1,000 + 900 + 60 + 7 = ____________

40,000,000 + 800,000 + 6,000 + 200 + 70 + 8 = ____________

200,000,000 + 50,000,000 + 4,000,000 + 600,000 + 40,000 + 2,000 + 800 + 60 + 1 =

____________

5,000,000 + 70 + 6 = ____________

60,000,000 + 7,000,000 + 400,000 + 30,000 + 8,000 + 200 + 50 + 5 =

____________

P.O. 4.01.08.05

NAME:______________________________ CLASS:__________ DATE:________

Follow the directions below.

I. Draw lines to match the numerals with the same amounts written in words.

| | |
|---|---|
| 100,987,654 | four hundred sixty-three million, five hundred seventy-two thousand, one hundred |
| 6,770,528 | sixty million, seven hundred thirty-five thousand, five |
| 463,572,100 | thirteen million, one hundred twenty-six thousand, ninety-three |
| 60,735,005 | six million, seven hundred seventy thousand, five hundred twenty-eight |
| 13,126,093 | one hundred million, nine hundred eighty-seven thousand, six hundred fifty-four |

II.

a. Write the numeral for seventeen million, two hundred seventy-six thousand, one hundred forty-four.

________________________________________

b. Write 24,763,219 in words.

________________________________________

________________________________________

________________________________________

## CHALLENGE!

What is the probability of picking an ace from a full deck of cards?

The probability is____________.

# SHARPENING YOUR SKILLS

**Units 62,63,64**

**Name:** ____________________ **Class:** ____________ **Date:** _________

1. Find the quotient and check.

$4\overline{)12.8}$ check

2. Find the quotient and check.

$4\overline{)4.8}$ check

3. What is the area of a rectangle that is 2.4 meters long and .6 meters wide?

ⓐ 14.4 sq. meters

ⓑ 3.0 sq. meters

ⓒ 1.44 sq. meters

ⓓ Not Here

4 Complete the series.

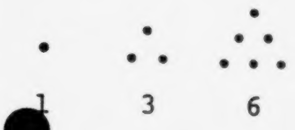
1, 5, 9, 13, ___, __

5. Which of the following is a square number?

ⓔ 6 ⓖ 20

ⓕ 16 ⓗ Not Here

6. Draw the next triangular number.



7. Which numeral below has a 5 in the ten thousands column?

ⓐ 5,246,017 ⓒ 1,506,823

ⓑ 8,451,209 ⓓ 3,465,182

8. Which numeral below has a 7 in the millions place?

ⓔ 7,243,106 ⓖ 4,725,865

ⓕ 72,523,994 ⓗ Not Here

9. Which numeral means the same as 2,000,000 + 800,000 + 40,000 + 3,000 + 60 + 4 ?

ⓐ 284,364 ⓒ 2,843,064

ⓑ 2,843,604 ⓓ Not Here

10. Write the following numeral in words.

25,467

______________________________

______________________________

______________________________

11. Which numeral means the same as seventy-four thousand, nine hundred eighty-eight?

ⓔ 704,988 ⓖ 74,980

ⓕ 74,988 ⓗ Not Here

Unit 65

## 4.06.08 ADDITION AND SUBTRACTION OF FRACTIONS WITH UNLIKE DENOMINATORS

(2 lessons)

### PERFORMANCE OBEJCTIVES

The student will be able to...

4.06.08.01B find equivalent fractions with a common denominator;

e.g.,

$$\frac{1}{2}, \frac{1}{3}$$

$$\frac{1}{2} = \frac{3}{6} \qquad \frac{1}{3} = \frac{2}{6}$$

4.06.08.02B add fractions having unlike denominators;

e.g.,

$$\begin{array}{rcr} \frac{1}{2} & = & \frac{2}{4} \\ +\frac{1}{4} & = & \frac{1}{4} \\ \hline & & \frac{3}{4} \end{array} \qquad \begin{array}{l} \frac{1}{2} + \frac{1}{3} = \square \\ \frac{3}{6} + \frac{2}{6} = \frac{5}{6} \end{array}$$

4.06.08.03B subtract fractions having unlike denominators;

e.g.,

$$\begin{array}{rcr} \frac{1}{2} & = & \frac{2}{4} \\ -\frac{1}{4} & = & \frac{1}{4} \\ \hline & & \frac{1}{4} \end{array} \qquad \begin{array}{l} \frac{1}{2} - \frac{1}{4} = \square \\ \frac{2}{4} - \frac{1}{4} = \frac{1}{4} \end{array}$$

4.06.08.04B solve word problems related to skills learned in this module.

e.g.,

If the drug store is $\frac{1}{2}$ mile from home and the grocery store is $\frac{7}{8}$ mile from home, how much further from home is the grocery store than the drug store?

## VOCABULARY

### TERMS

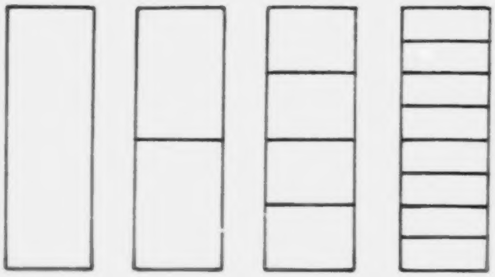
equivalent
numerator
denominator
common denominator

---

## GETTING STARTED 1:

Prepare and distribute fraction strips to each student or group of students.

e.g.,



Say, "Look at your fraction strips. How many halves equal 1 whole?" (2 halves equal 1 whole.) Write this information on the chalkboard and ask the students to write it in their notebooks.

e.g.,

$$\frac{2}{2} = 1$$

Repeat this procedure for fourths and eighths. Say, "We can always call a fraction by another name. We can always find another fraction that is equivalent. Look at the strip showing fourths. Fold back the strip to show 3 fourths. Use your eighths strip to find how many eighths are equivalent to 3 fourths. What did you find?" (6 eighths are equivalent to 3 fourths.) Write this on the chalkboard and ask the students to write it in their notebooks.

e.g.,

$$\frac{6}{8} = \frac{3}{4}$$

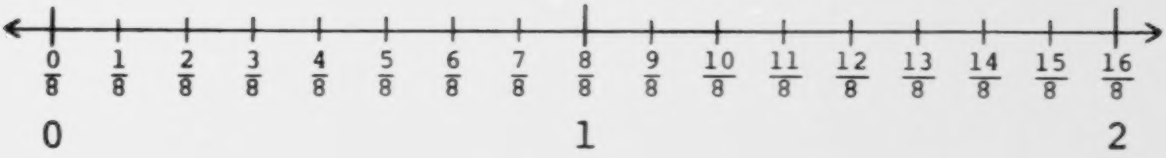
Repeat this procedure with other examples showing equivalent fractions.

e.g.,

$$\frac{1}{2} = \frac{2}{4} \qquad \frac{8}{8} = \frac{4}{4} \qquad \frac{1}{4} = \frac{2}{8}$$

## GETTING STARTED 2:

Prepare and display a number line marked in eighths.
e.g.,


$\frac{0}{8}$
$\frac{1}{8}$
$\frac{2}{8}$
$\frac{3}{8}$
$\frac{4}{8}$
$\frac{5}{8}$
$\frac{6}{8}$
$\frac{7}{8}$
$\frac{8}{8}$
$\frac{9}{8}$
$\frac{10}{8}$
$\frac{11}{8}$
$\frac{12}{8}$
$\frac{13}{8}$
$\frac{14}{8}$
$\frac{15}{8}$
$\frac{16}{8}$
0
1
2

Say, "Look at the number line. What is another name for one whole? (Another name for one whole is 8 eighths.) What is another name for two wholes? (Another name for 2 wholes is 16 eighths.) We can show addition and subtraction of fractions by using the number line." Write an example on the chalkboard.
e.g.,

$$\frac{2}{8} + \frac{3}{8} = \boxed{\phantom{00}}$$

Ask the students to write the example in their notebooks. Ask a student to demonstrate this addition on the number line. Say, "When we add, in which direction do we move on the number line? (We move to the right.) Point to 2 eighths. From that point, move 3 eighths to the right. At what point are you?" (I am at the point marked 5 eighths.) Ask a student to write the sum on the chalkboard.
e.g.,

$$\frac{2}{8} + \frac{3}{8} = \frac{5}{8}$$

Say, "What part of the fractions changed when we added? (Only the numerator changed. The denominator stayed the same.) Why does the denominator stay the same?" (The size of the parts, eighths, doesn't change. Only the number of parts changes.)

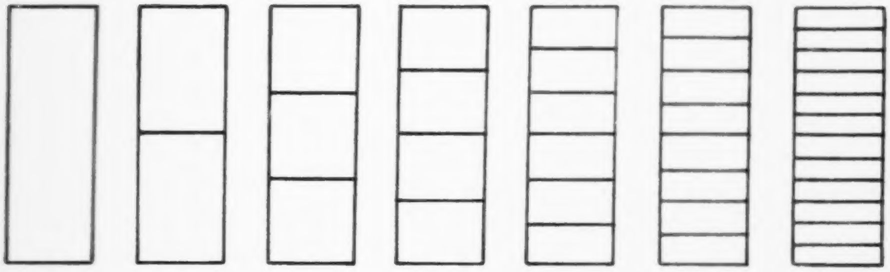
Repeat this procedure for subtracting fractions with like denominators. Write several examples on the chalkboard and ask the students to complete them in their notebooks.

**4.06.08**

**4.06.08.01** **find equivalent fractions with a common denominator**

**STRATEGY 1:** Prepare and distribute paper fraction strips for wholes, halves, thirds, fourths, sixths, eighths, and twelfths.

e.g.,



Say, "Fold back the strip showing halves so only one-half is showing. Fold back the strip showing thirds so that only one third is showing. What can we say about $\frac{1}{2}$ and $\frac{1}{3}$? (One-half is greater than one-third.) These fractions are not equivalent. Can we find how many thirds $\frac{1}{2}$ is equal to? Explain. (No, we can't match up thirds and halves for this example.) Is there any fraction strip that we have which contains both the equivalent of $\frac{1}{2}$ and the equivalent of $\frac{1}{3}$? (We can try fourths. This strip contains an equivalent of $\frac{1}{2}$.) Does the fourths strip contain an equivalent of $\frac{1}{3}$? Explain. (No, it shows that $\frac{1}{2}$ equals $\frac{2}{4}$, but it doesn't contain an equivalent of $\frac{1}{3}$.) Can we use the sixths strip to find the equivalents of both numbers? Explain. (Yes, the sixths strip shows that $\frac{1}{2}$ equals $\frac{3}{6}$ and that $\frac{1}{3}$ equals $\frac{2}{6}$.) When we can use one strip to show the equivalents of two different numbers, we call that denominator the common denominator of both fractions. What is the common denominator for $\frac{1}{2}$ and $\frac{1}{3}$? (The common denominator is 6.) What are the equivalent fractions for $\frac{1}{2}$ and $\frac{1}{3}$ expressed as sixths? (The equivalent fractions are $\frac{3}{6}$ and $\frac{2}{6}$.) Use your fraction strips to find the common denominator for $\frac{1}{3}$ and $\frac{1}{12}$.

**STRATEGY 1:** cont'd

What did you find?" (The common denominator for both fractions is twelfths, $\frac{1}{3}$ equals $\frac{4}{12}$ and $\frac{1}{12}$ equals $\frac{1}{12}$. Both numbers can be expressed as twelfths.) Write several pair of fractions on the chalkboard. Ask the students to use their fraction strips to find equivalents fractions with a common denominator. e.g.,

$\frac{1}{3}$ and $\frac{1}{4}$ can be expressed as $\frac{4}{12}$ and $\frac{3}{12}$.
$\frac{1}{2}$ and $\frac{1}{6}$ can be expressed as $\frac{3}{6}$ and $\frac{1}{6}$.
$\frac{1}{4}$ and $\frac{1}{6}$ can be expressed as $\frac{3}{12}$ and $\frac{2}{12}$.

**STRATEGY 2:**

Prepare and display two fractions with different denominators on the chalkboard, e.g., $\frac{1}{3}$ and $\frac{1}{5}$.

Say, "Look at these fractions. What is the same and what is different about the two fractions? (They have numerators that are the same, but they have different denominators.) The numerators are frequently different, but it is often important to find equivalent fractions which have a common denominator. One way to do this is by finding the least common multiple of both denominators." Ask a student to find the least common multiple of 3 and 5 at the chalkboard as the other students work in their notebooks.
e.g.,

3, 6, 9, 12, 15, 18, 21, 24, 27, 30

5, 10, 15, 20, 25, 30, 35, 40, 45, 50

LCM = 15

Say, "We can rename our fractions as equivalent fractions with a denominator of 15."

**STRATEGY 2:** cont'd

Write the following on the chalkboard:

$$\frac{1}{3} = \frac{\Box}{15}$$

$$\frac{1}{5} = \frac{\Box}{15}$$

Say, "We have learned how to rename fractions as equivalents when we know the new denominator. How will we do that? (To be equivalent, the numerator and the denominator must be multiplied by the same number. We can multiply 3 by 5 to equal 15, the denominator. Therefore, we will multiply the numerator by 5 to find the new numerator.) What fraction is equivalent to $\frac{1}{3}$ with a denominator of 15?" ($\frac{5}{15}$ is equivalent to $\frac{1}{3}$.) Ask a student to write 5 in the appropriate place on the chalkboard.

e.g.,

$$\frac{1}{3} = \frac{\boxed{5}}{15}$$

$$\frac{1}{5} = \frac{\Box}{15}$$

Ask a student to complete the equivalent for $\frac{1}{5}$ in the same manner.

e.g.,

$$\frac{1}{3} = \frac{\boxed{5}}{15}$$

$$\frac{1}{5} = \frac{\boxed{3}}{15}$$

Ask the students to write the fractions in their notebooks.

Repeat this procedure to find equivalent fractions for other pairs of fractions.

**4.06.08.02** **add fractions having unlike denominators**

**STRATEGY 1:** Prepare and distribute fraction strips as in Strategy 1, P.O. 4.06.08.01. Write an addition example on the chalkboard using fractions with unlike denominators

**STRATEGY 1:**
cont'd

and ask the students to write the example in their notebooks.

e.g.,

$$\begin{array}{r} \frac{1}{2} \\ +\frac{1}{3} \\ \hline \end{array}$$

Ask a student to read the example aloud. Say, "What do we have to find in this example? (We have to find the sum of $\frac{1}{2}$ and $\frac{1}{3}$.) What do we know about adding fractions? (We add the numerators and keep the same denominators.) Can we do that with this example? Explain. (No, because the denominators are different.) Look at your fraction strips. Do you think our answer will be in halves or in thirds? (The answer can't be in either one.) Why do you think that?" Allow for a variety of student responses.

e.g.,

- The fractions are different sizes.
- The fractions have different denominators.

Say, "In order to add fractions, we must make sure that the size of each part is the same. The number of parts in each fraction can be different, but the size of each part must be the same. What does that mean for our fractions? (They must have the same denominator.) Use your fraction strips to find equivalent fractions for $\frac{1}{2}$ and $\frac{1}{3}$ which have a common denominator. What did you find?" (If we use the sixths strip, we find that $\frac{1}{2}$ equals $\frac{3}{6}$ and $\frac{1}{3}$ equals $\frac{2}{6}$.) On the chalkboard, write the equivalent fractions in the example. Ask the students to write them in their notebooks.

e.g.,

$$\begin{array}{rcr} \frac{1}{2} & = & \frac{3}{6} \\ +\frac{1}{3} & = & +\frac{2}{6} \\ \hline \end{array}$$

**STRATEGY 1:** cont'd

Say, "Can we add the fractions now? Explain. (Yes, we will have an answer expressed in sixths because both denominators are sixths.) What will our sum be?" ($\frac{3}{6}$ plus $\frac{2}{6}$ equals $\frac{5}{6}$.) Complete the example on the chalkboard as the students complete it in their notebooks.

Repeat this procedure with other examples.

**STRATEGY 2:**

Prepare and display an example requiring addition of fractions with unlike denominators and ask the students to write the example in their notebooks.

e.g.,

$$\begin{array}{r} \frac{1}{4} \\ +\frac{3}{5} \\ \hline \end{array}$$

Ask a student to read the example aloud. Say, "In order to add two fractions, they must have the same size pieces. What does that tell us about the fractions? (It means that both fractions must have the same denominator.) Look at the two fractions in our example. Do they have the same denominator? (No, one has a denominator of 4 and the other has a denominator of 5.) How can we change the fractions so that they have the same denominator?" (We can find equivalent fractions for both that have will the same denominator.) Ask a student to list multiples of 4 and 5 on the chalkboard.

e.g.,

**Multiples of 4:** 4 8 12 16 20 24 28 32 36 40

**Multiples of 5:** 5 10 15 20 25 30 35 40 45 50

Say, "What numbers on the list of multiples of 4 are also on the list of multiples of 5? (20 and 40 are on both lists.) Which of the two common multiples is the lowest?" (20 is the LCM.) On the chalkboard write: LCM = 20. Say, "To change the fractions in

**STRATEGY 2:** cont'd

our example to equivalent fractions with a denominator of 20, we must multiply the numerator and the denominator by the same number." Demonstrate this at the chalkboard.

e.g.,

$$\begin{array}{r} \frac{1}{4} \times \frac{5}{5} = \frac{5}{20} \\ +\frac{3}{5} \times \frac{4}{4} = \frac{12}{20} \end{array}$$

Say, "Now we can add the two fractions. What is the sum? (The sum is $\frac{17}{20}$.) What steps did we take to add fractions with unlike denominators?" (We made a list of multiples for each denominator and found the lowest common denominator. Then we changed the fractions to equivalent fractions with a common denominator. Then we added.) List these steps on the chalkboard. Ask the students to copy the steps into their notebooks. Repeat this procedure with other examples.

**Note:** When finding equivalent fractions it is important to reinforce that we are multiplying by a number that is another name for one and, therefore, not changing the value of the original fractions.

**4.06.08.03** **subtract fractions having unlike denominators**

**STRATEGY 1:** Adapt Strategy 1, P.O. 4.06.08.02, for use with subtraction examples.

**STRATEGY 2:** Adapt Strategy 2, P.O.4.06.08, for use with subtraction examples.

**4.06.08.04** **solve word problems related to skills learned in this module**

**STRATEGY 1:** Prepare and display a word problem.

**STRATEGY 1:** cont'd

e.g.,

Janice jogged $\frac{1}{2}$ mile in the morning and $\frac{2}{5}$ mile in the afternoon. How far did she jog that day?

Ask a student to read the problem aloud. Say, "What information do we know? (We know the fractional parts of a mile Janice jogged in the morning and in the afternoon.) What must we find? (We must find how far Janice jogged that day.) How can we solve this problem? (We can add $\frac{1}{2}$ mile and $\frac{2}{5}$ mile.) When we add fractions, what part of the fractions must be the same? (The denominators must be the same.) How can we change these fractions so the denominators are the same?" (We can find the least common multiple of 2 and 5. Then we can rename $\frac{1}{2}$ and $\frac{2}{5}$ as equivalent fractions with the least common multiple as the new denominator.)

Ask a student to rename the fractions and add them on the chalkboard as the other students work in their notebooks.

e.g.,

2 4 6 8 ⑩

5 ⑩ 15 20 25

LCM = 10

$$\begin{array}{r} \frac{1}{2} \times \frac{5}{5} = \frac{5}{10} \\ +\frac{2}{5} \times \frac{2}{2} = \frac{4}{10} \\ \hline \frac{9}{10} \text{ mile} \end{array}$$

Say, "What is the least common multiple of 2 and 5? (10 is the least common multiple.) What are other names for $\frac{1}{2}$ and $\frac{2}{5}$ when the denominator is 10? ($\frac{1}{2}$ can be renamed as $\frac{5}{10}$. $\frac{2}{5}$ can be renamed as $\frac{4}{10}$.) What is the sum? (The sum is $\frac{9}{10}$.) What is the answer to the problem?" (Janice jogged $\frac{9}{10}$ mile that day.)

Repeat this procedure using other word problems involving addition or subtraction.

**P.O.** 4.06.08.01

**NAME:** ______________________ **CLASS:** __________ **DATE:** __________

Follow the directions below.

I. Find the least common multiple for each pair of numerals below.

| | Common Multiples | LCM |
|---|---|---|
| 3 | 3, 6, 9, 12, 15 | 12 |
| 4 | 4, 8, 12, 16, 20 | |
| 2 | | |
| 5 | | |

II. For each pair of fractions below, find equivalent fractions with a common denominator.

---

$\frac{1}{3}$ $\quad$ $\frac{1}{4}$

LCM of 3 and 4 = $\boxed{12}$

$\frac{1}{3} = \boxed{\frac{4}{12}}$

$\frac{1}{4} = \boxed{\frac{3}{12}}$

---

$\frac{1}{2}$ $\quad$ $\frac{2}{5}$

LCM of 2 and 5 = $\boxed{\phantom{00}}$

$\frac{1}{2} = \boxed{\phantom{00}}$

$\frac{2}{5} = \boxed{\phantom{00}}$

---

$\frac{3}{8}$ $\quad$ $\frac{1}{4}$

LCM of 8 and 4 = $\boxed{\phantom{00}}$

$\frac{3}{8} = \boxed{\phantom{00}}$

$\frac{1}{4} = \boxed{\phantom{00}}$

P.O. 4.06.08.02-.03

NAME: ____________________ CLASS: __________ DATE: __________

Solve the examples below.

① LCM = $\boxed{8}$

$$\frac{1}{2} = \boxed{\frac{4}{8}}$$
$$+\frac{3}{8} = \boxed{\frac{3}{8}}$$
$$\overline{\phantom{xxxxx}\boxed{\frac{7}{8}}}$$

② LCM = $\boxed{\phantom{0}}$

$$\frac{2}{5} = \boxed{\phantom{0}}$$
$$+\frac{3}{10} = \boxed{\phantom{0}}$$
$$\overline{\phantom{xxxxx}\boxed{\phantom{0}}}$$

③ LCM = $\boxed{\phantom{0}}$

$$\frac{2}{3} = \boxed{\phantom{0}}$$
$$-\frac{3}{8} = \boxed{\phantom{0}}$$
$$\overline{\phantom{xxxxx}\boxed{\phantom{0}}}$$

④ LCM = $\boxed{8}$

$$\frac{5}{8} - \frac{1}{4} = \boxed{\phantom{0}}$$
$$\boxed{\frac{5}{8}} - \boxed{\frac{2}{8}} = \boxed{\frac{3}{8}}$$

⑤ LCM = $\boxed{\phantom{0}}$

$$\frac{3}{5} - \frac{1}{10} = \boxed{\phantom{0}}$$
$$\boxed{\phantom{0}} - \boxed{\phantom{0}} = \boxed{\phantom{0}}$$

⑥ LCM = $\boxed{\phantom{0}}$

$$\frac{4}{9} + \frac{1}{3} = \boxed{\phantom{0}}$$
$$\boxed{\phantom{0}} + \boxed{\phantom{0}} = \boxed{\phantom{0}}$$

⑦ LCM = $\boxed{\phantom{0}}$

$$\frac{2}{3} = \boxed{\phantom{0}}$$
$$-\frac{1}{4} = \boxed{\phantom{0}}$$
$$\overline{\phantom{xxxxx}\boxed{\phantom{0}}}$$

⑧ LCM = $\boxed{\phantom{0}}$

$$\frac{3}{6} + \frac{1}{2} = \boxed{\phantom{0}}$$
$$\boxed{\phantom{0}} + \boxed{\phantom{0}} = \boxed{\phantom{0}}$$

⑨ LCM = $\boxed{\phantom{0}}$

$$\frac{3}{12} - \frac{1}{6} = \boxed{\phantom{0}}$$
$$\boxed{\phantom{0}} - \boxed{\phantom{0}} = \boxed{\phantom{0}}$$

**CHALLENGE!** Find the sum.

$$\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \boxed{\phantom{00}}$$

P.O. 4.06.08.04

NAME: ______________________________ CLASS: __________ DATE: ________

Solve the problems below.

1. Millie bought $\frac{1}{2}$ pound of ham and $\frac{1}{4}$ pound of cheese. How much did the two items weigh together?

The ham and cheese weighed ______ pound.

2. Sandy bought $\frac{7}{8}$ pound of pistachio nuts and $\frac{3}{4}$ pound of cashews. How much more did the pistachio nuts weigh than the cashews?

The pistachio nuts weighed ________ pound more.

3. Jesse ran $\frac{3}{4}$ mile. He stopped to rest and then he ran $\frac{1}{8}$ mile farther. How far did Jesse run in all?

Jesse ran ______ mile.

4. Bill spent $\frac{1}{3}$ hour washing the dishes. Then he spent $\frac{1}{4}$ hour drying the dishes. How much more time did he spend washing dishes than drying them?

Bill spent ______ hour more washing the dishes.

## 4.04.05 MULTIPLICATION OF 2-DIGIT NUMBERS

(2-3 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.04.05.01A multiply 10, and multiples of 10, by 10 and multiples of 10;

e.g.,

$$\begin{array}{r} 50 \\ \text{x}10 \\ \hline 500 \end{array} \qquad \begin{array}{r} 40 \\ \text{x}30 \\ \hline 1{,}200 \end{array}$$

4.04.05.02A multiply any 2-digit number by 10 and multiples of 10;

e.g.,

$$\begin{array}{r} 42 \\ \text{x}10 \\ \hline 420 \end{array} \qquad \begin{array}{r} 42 \\ \text{x}30 \\ \hline 1{,}260 \end{array}$$

4.04.05.03A multiply a 2-digit number by a 2-digit number without regrouping (exchange);

e.g.,

$$\begin{array}{rl} 34 & \\ \text{x}12 & \\ \hline 68 & \longrightarrow (\ 2 \text{ x } 34) \\ +340 & \longrightarrow (10 \text{ x } 34) \\ \hline 408 & \end{array}$$

4.04.05.04A multiply a 2-digit number by a 2-digit number with regrouping (exchange);

e.g.,

$$\begin{array}{rl} 52 & \\ \text{x}49 & \\ \hline 468 & \longrightarrow (\ 9 \text{ x } 52) \\ +2{,}080 & \longrightarrow (40 \text{ x } 52) \\ \hline 2{,}548 & \end{array}$$

4.04.05.05A solve word problems related to skills learned in this module.

e.g.,

There are 12 eggs in one carton.

How many eggs are there in 68 cartons?

**4.04.05**

## VOCABULARY

### TERMS

factors
product
partial product

---

## GETTING STARTED 1:

Prepare and distribute squared material (ten strips) to each student or group of students. Say, "We will use the ten strips to review multiplication by 10. Take 2 ten strips and place them in front of you." Ask a student to write a multiplication sentence on the chalkboard to represent the ten strips.

e.g.,

$$2 \times 10 = 20 \qquad \begin{array}{r} 10 \\ \times\ 2 \\ \hline 20 \end{array}$$

Repeat this procedure with several examples. Say, "What do you notice about each product when ten is a factor? (The product is the same as the other factor with a zero to the right of it.) Would it change the product if we reversed the factors?" (No, the product would not change.)

Repeat this procedure for other 1-digit numbers multiplied by 10.

---

## GETTING STARTED 2:

Prepare and display several guess and check problems regarding factors.

e.g.,

> I am thinking of two numbers. Their sum is 5.
> Their product is 6. What are my numbers?

Say, "What are we asked to find? (We are asked to find two numbers whose sum is 5 and whose product is 6.) How can we try to solve the problem? (We can make a list of pairs of numbers whose sum is 5.) What might we do after that?" (We could find the pair which also has a product of 6.)

## GETTING STARTED 2: cont'd

Ask the students to make lists in their notebooks while one student works at the chalkboard.
e.g.,

| Sums of 5 | Products |
|---|---|
| 0 + 5 | 0 x 5 = 0 |
| 1 + 4 | 1 x 4 = 4 |
| 2 + 3 | 2 x 3 = 6 |

Say, "Which numbers fit all the clues? Explain." (2 and 3 fit the clues. Their sum is 5 and their product is 6.)

Repeat this procedure with similar problems.

**Note:** Allow for the possibility that a student may find the answer by using an alternative strategy.

**4.04.05**

**4.04.05.01** **multiply 10, and multiples of 10, by 10 and multiples of 10**

**STRATEGY 1:** Prepare and distribute squared material (ten strips) to each student or group of students. Write the following example on the chalkboard: $10 \times 10 = \square$.

Say, "Use your squared material to show 10 groups of 10. What is the product?" (10 tens equal 100.) Ask a student to write the product on the chalkboard. Ask another student to write the example in vertical format on the chalkboard.

e.g.,

$$10 \times 10 = 100 \qquad \begin{array}{r} 10 \\ \underline{\times 10} \\ 100 \end{array}$$

On the chalkboard write: $10 \times 20 = \square$.

Say, "Now use your squared material to show 10 groups of 20. In your notebooks, write the example which represents 10 groups of 20." Repeat this procedure using other multiples of 10 multiplied by 10. Say, "What happens each time we multiply a factor by 10? (The product is the same as the factor followed by an extra zero.) This rule is true any time we multiply by 10."

On the chalkboard write: $\begin{array}{r} 60 \\ \underline{\times 30} \end{array}$. Say, "This time we will be multiplying by a multiple of ten. Let's see what shortcut we can find. What is the product of 3 x 60? (The product of 3 times 60 is 180.) To find the product of 30 times 60, we can count the zeros in the factors and write that amount of zeros in the product. Then we can multiply the remaining digits."

e.g.,

$$\begin{array}{r} 60 \\ \underline{\times 30} \\ 1{,}800 \end{array}$$

Say, "The product of 30 times 60 is 1,800." Repeat this procedure using other multiples of ten.

**STRATEGY 2:** Write an example on the chalkboard, e.g., $\begin{array}{r} 40 \\ \underline{\times 30} \end{array}$.

Say, "This problem requires multiplying by a multiple of 10. Let's see what happens when we multiply by 10." Write the following on the chalkboard:

$10 \times 10 = \boxed{\phantom{000}}$ $\quad$ $1 \text{ ten} \times 1 \text{ ten} = \boxed{\phantom{000}}$

Say, "When we multiply 10 x 10, what is the product?" (The product is 100.) Write the answer in both spaces. Say, "If we multiply 2 tens by 1 ten, our product is 2 hundred. Any time we multiply tens by tens, our product can be expressed in hundreds. Look at the original example on the chalkboard, 30 x 40. This example asks us to multiply 3 tens times 4 tens. What is the product of 3 x 4? (3 x 4 = 12.) What is the product of ten times ten? (The product of ten times ten is one hundred.) Therefore, the product of 3 tens and 4 tens is 12 hundred." Write the answer on the chalkboard. Say, "There is a simpler way to find products when we multiply by 10 or a multiple of 10. We write the same number of zeros in the product as there are zeros in the factors. We then multiply the remaining numerals." Demonstrate this on the chalkboard.

e.g., $\begin{array}{r} 4 \\ \times 3 \\ \hline 12 \end{array}$ $\qquad$ $\begin{array}{r} 40 \\ \times 30 \\ \hline 1{,}200 \end{array}$

Ask the students to write the example in their notebooks. On the chalkboard write:

$\begin{array}{r} 6 \\ \underline{\times 4} \end{array}$ $\qquad$ $\begin{array}{r} 60 \\ \underline{\times 40} \end{array}$

Ask the students to solve both examples in their notebooks as a student solves them at the chalkboard.

Repeat this procedure using other multiples of ten.

**4.04.05**

**4.04.05.02** **multiply any 2-digit number by 10 and multiples of 10**

**STRATEGY 1:** Write the following example on the chalkboard: $\begin{array}{r} 28 \\ \underline{x40} \end{array}$.

Say, "What is the easy way to multiply by multiples of 10? (We can multiply by the non-zero numerals and place a zero to the right of the product.) In this example, to keep the place values in order, we will place the zero in the product first."

e.g.,

$$\begin{array}{r} 28 \\ \underline{x40} \\ 0 \end{array}$$

Say, "Now we can multiply by the 4 in the tens place. Because the zero is already in the ones place in the product, we will continue by writing the next digit of the product in the tens place." Ask a student to multiply by 4 at the chalkboard as the other students work in their notebooks.

e.g.,

$$\begin{array}{r} \overset{3}{2}8 \\ x40 \\ \hline 1{,}120 \end{array}$$

Say, "What is the product?" (The product is 1,120.) Repeat this procedure using other examples.

**4.04.05.03** **multliply a 2-digit number by a 2-digit number without regrouping**

**STRATEGY 1:** Write the following multiplication example on the chalkboard: $\begin{array}{r} 32 \\ \underline{x23} \end{array}$. Ask a student to read the example aloud. Cover the 2 in the factor 23. Say, "We know how to multiply 3 times 32." Cover the 3 in the factor 23 and say, "This 2 represents 20 because it is in the tens place. We know how to multiply 20 times 32. Today we will learn to do both multiplications in one example."

**STRATEGY 1:** cont'd

Ask a student to multiply 3 times 32 at the chalkboard as the other students do the same in their notebooks. Say, "How much is 3 times 32? (3 times 32 equals 96.) We call 36 a partial product because we have not finished multiplying. 96 is only part of the whole product." Next to 96 on the chalkboard write: (3 x 32).

e.g.,

$$\begin{array}{rl} 32 & \\ \underline{\times 23} & \\ 96 & (3 \times 32) \end{array}$$

Say, "We have multiplied by 3, now we must multiply by 20. What is the shortcut for multiplying by a multiple of ten? (We write a zero in the ones place in the product. Then we can multiply as if the 20 were a 2.) Since we already have a digit in the ones place in the product, we will start another row for the next part of the product." Demonstrate at the chalkboard.

e.g.,

$$\begin{array}{rl} 32 & \\ \underline{\times 23} & \\ 96 & (3 \times 32) \\ 0 & \end{array}$$

Say, "When we multiply by the 2 we will start writing to the left of zero. First we will multiply 2 times 2." Demonstrate at the chalkboard how we start on the right again, when we multiply 2 times 2.

Say, "How much is 2 times 2?" (2 times 2 equals 4.) Demonstrate where the 4 is written in the second partial product. Ask the students to write this in the their notebooks.

e.g.,

$$\begin{array}{rl} 32 & \\ \underline{\times 23} & \\ 96 & (3 \times 32) \\ 40 & \end{array}$$

**STRATEGY 1:** cont'd

Say, "How much is 2 times 3?" (2 times 3 equals 6.) Demonstrate where the 6 is written in the second partial product. Ask the students to write this in their notebooks.

e.g.,

$$\begin{array}{rl} 32 & \\ \underline{\times 23} & \\ 96 & (\ 3 \times 32) \\ \underline{640} & (20 \times 32) \end{array}$$

Say, "To find the product of 23 times 32, we must add both partial products." Ask a student to add 96 plus 640 on the chalkboard as the other students do the same in their notebooks.

e.g.,

$$\begin{array}{rl} 32 & \\ \underline{\times 23} & \\ 96 & (\ 3 \times 32) \\ \underline{+640} & (20 \times 32) \\ 736 & \end{array}$$

Say, "What is the product?" (The product is 736.) Repeat this procedure using other examples.

**Note:** Some students may benefit from using the distributive property of multiplication over addition before proceeding to the algorithm.

e.g.,

$$\begin{array}{r} 32 \\ \underline{\times 23} \end{array} = \begin{array}{r} 32 \\ \underline{\times 20} \\ 640 \end{array} + \begin{array}{r} 32 \\ \underline{\times\ 3} \\ 96 \end{array} = \begin{array}{r} 96 \\ \underline{+640} \\ 736 \end{array}$$

**4.04.05.04** **multiply a 2-digit number by a 2-digit number with regrouping**

**STRATEGY 1:** Write the following multiplication example on the chalkboard: $\begin{array}{r} 53 \\ \underline{\times\ 24} \end{array}$.

Ask a student to read the example aloud. Say, "How will we multiply 24 times 53? (First we will multiply 4 times 53. Then we will multiply 20 times

**STRATEGY 1:** cont'd

53.) How much is 4 times 3? (4 times 3 equals 12.) Can we write a 2-digit answer in the ones place in the product? (No.) What will we do?" We will think of 12 as 10 plus 2. Then we can write the 2 in the ones place and we can write a 1 above the 5 to represent the ten.) Ask a student to demonstrate this at the chalkboard.

e.g.,

$$\begin{array}{r} 1\phantom{3} \\ 53 \\ \underline{\times 24} \\ 2 \end{array}$$

Ask the students to write this in their notebooks. Say, "What will we multiply next? (We will multiply 4 times 5 tens.) How much is 4 times 5 tens? (4 times 5 tens is 20 tens.) We must also add the 1 above the 5 tens as another ten. 4 times 5 tens equals 20 tens, plus 1 more is 21 tens. How will we write 21 in the product? (We will write the 2 in the hundreds place and the 1 in the tens place.) Ask a student to demonstrate this at the chalkboard as the other students write it in their notebooks.

e.g.,

$$\begin{array}{rl} 1\phantom{3} & \\ 53 & \\ \underline{\times 24} & \\ 212 & (4 \times 53) \end{array}$$

Say, " What is the first partial product? (The first partial product is 212.) Before we begin to multliply by 20, cross out, or erase, the 1 above the 5. We do not want to add it in again by mistake. Now we will multiply by 20. What shall we do first?" (First we will place a zero in the ones place in the second partial product. Then we can multiply as if the 20 were a 2.) Ask a student to do this at the chalkboard as the other students do the same in their notebooks.

**4.04.05**

**STRATEGY 1:** cont'd

e.g.,

$$\begin{array}{rl} \cancel{1} & \\ 53 & \\ \underline{\times 24} & \\ 212 & (\ 4 \times 53) \\ \underline{1,060} & (20 \times 53) \end{array}$$

Say, "How do we find the product?" (We add the two partial products.) Ask a student to do this at the chalkboard as the other students do the same in their notebooks.

e.g.,

$$\begin{array}{rl} \cancel{1} & \\ 53 & \\ \underline{\times 24} & \\ 212 & (\ 4 \times 53) \\ \underline{+1,060} & (20 \times 53) \\ 1,272 & \end{array}$$

Say, "What is the product?" (The product is 1,272.)

Repeat this procedure using other examples.

See **Note** after Strategy 1, P.O.4.04.05.03.

4.04.05.05 **solve word problems related to skills learned in this module**

**STRATEGY 1:** Prepare and display a word problem.

e.g.,

> A case of dog food contains 24 cans. If Maria buys 16 cases, how many cans of dog food will she have?

Ask a student to read the problem aloud. Say, "What do we have to find? (We must find the number of cans of dog food there are in 16 cases.) What information does the problem give us? (We know that there are 24 cans in each case.) How can we find a solution? (We can add 24 sixteen times.) That is one way to solve the problem, but is there a more efficient way?" (We can multiply 16 x 24.)

Ask one student to solve the problem at the chalkboard as the other students work in their notebooks.

**STRATEGY 1:** cont'd

e.g.,

$$\begin{array}{rl} \cancel{2} & \\ 24 & \text{cans per case} \\ \underline{\text{x}16} & \text{cases} \\ 144 & (\ 6 \text{ x } 24) \\ \underline{+240} & (10 \text{ x } 24) \\ 384 & \text{cans in all} \end{array}$$

Say, "How many cans of dog food will Maria have?" (She will have 384 cans of dog food.)

Repeat this procedure using other problems.

**STRATEGY 2:** Prepare a calendar and display a two-step word problem.

e.g.,

> Jessica puts 15 pennies into her bank each day of the week except Saturday. How many pennies did she put in her bank in March?

Ask a student to read the problem aloud. Say, "What must we find? (We must find the number of pennies Jessica put in her bank in March.) How can we solve the problem? (First, we must find out how many days she put money into the bank.) How can we do that?" (We can use a calendar.) Display a calendar for the month of March.

e.g.,

| March | | | | | | |
|---|---|---|---|---|---|---|
| Sun. | Mon. | Tues. | Wed. | Thurs. | Fri. | Sat. |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | 31 | | | |

Say, "How many days are in March? (There are 31 days in March.) How many of those days are Saturdays? (4 of the days are Saturdays.) How can we find out how many days Jessica put 15 pennies into her bank?" (We

**STRATEGY 2:** cont'd

can subtract 4 from 31). Ask a student to find the difference at the chalkboard as the other students work in their notebooks. Say, "How many days did Jessica put money in her bank? (She put money in her bank on 27 days in March.) How can we find out how many pennies she put in her bank in March? (We can multiply 15 times 27.) Could we also multiply 27 times 15? Explain." (Yes, changing the order of the factors will not change the product.)

Ask a student to solve the problem at the chalkboard as the other students work in their notebooks.

e.g.,

$$\begin{array}{r l} \cancel{1} & \\ \cancel{3} & \\ 15 & \text{pennies a day} \\ \underline{\text{x}27} & \text{days} \\ 105 & \\ \underline{+300} & \\ 405 & \text{pennies in all} \end{array}$$

Say, "How many pennies did Jessica put in her bank in March? (She put 405 pennies in her bank in March.) How much money are 405 pennies worth?" (405 pennies are worth 4 dollars and 5 cents.)

Repeat this procedure using other two-step problems.

**P.O.** 4.04.05.01

**NAME:** ______________________ **CLASS:** __________ **DATE:** ________

Multiply. Use the key to solve the riddle.

What begins with "e" and ends with "e" and has only one letter in it?

| | | | | |
|---|---|---|---|---|
| ①<br>20<br>x10<br>200 | ②<br>20<br>x20 | ③<br>30<br>x20 | ④<br>40<br>x10 | ⑤<br>70<br>x30 |
| ⑥<br>60<br>x10 | ⑦<br>40<br>x20 | ⑧<br>30<br>x10 | ⑨<br>40<br>x60 | ⑩<br>20<br>x30 |

Key

| A | E | L | N | O | P | V |
|---|---|---|---|---|---|---|
| 200 | 600 | 800 | 400 | 300 | 2,400 | 2,100 |

Answer

A ___ ___ ___ ___ ___ ___ ___ ___ ___

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

P.O. 4.04.05.02

NAME: ____________________ CLASS: __________ DATE: ________

Solve the examples below.

| | | | |
|---|---|---|---|
| ①<br>34<br>x20 | ②<br>14<br>x40 | ③<br>72<br>x40 | ④<br>65<br>x60 |
| ⑤<br>53<br>x70 | ⑥<br>91<br>x10 | ⑦<br>32<br>x40 | ⑧<br>44<br>x50 |
| ⑨<br>52<br>x20 | ⑩<br>43<br>x30 | ⑪<br>15<br>x10 | ⑫<br>22<br>x40 |

**Do you remember?** Find the area of a rectangle with a length of 3.2 meters and a width of 0.9 meters.

area = ______________ square meters

P.O. 4.04.05.03 & .05

NAME: ____________________ CLASS: __________ DATE: __________

Follow the directions below.

I. Complete each example.

| | | | |
|---|---|---|---|
| ① 32<br>x23 | ② 41<br>x22 | ③ 25<br>x11 | ④ 33<br>x22 |
| ⑤ 13<br>x33 | ⑥ 24<br>x22 | ⑦ 43<br>x12 | ⑧ 32<br>x32 |

II. Solve the problems below.

1. There are 22 rows in the auditorium. Each row has 22 seats. How many seats are there in the auditorium?

_______ seats

solve

2. How many eggs are there in 21 dozen?

_______ eggs

solve

P.O. 4.04.05.04-.05

NAME:______________________ CLASS:__________ DATE:________

Follow the directions below.

A. Complete each example.

| | | | |
|---|---|---|---|
| ①<br>35<br>x23 | ②<br>42<br>x54 | ③<br>37<br>x35 | ④<br>87<br>x32 |
| ⑤<br>58<br>x27 | ⑥<br>63<br>x45 | ⑦<br>29<br>x18 | ⑧<br>36<br>x72 |

B. Solve the problems below.

| | |
|---|---|
| 1. The school received 72 boxes of chalk with 24 pieces of chalk in each box. How many pieces of chalk were there in all?<br>____ pieces of chalk | solve |
| 2. The school received construction paper in twelve different colors. There were 65 sheets of each color. How many sheets of construction paper did the school receive?<br>____ sheets of construction paper | solve |
| 3. There were 93 packages of oaktag. Each package had 36 sheets of oaktag. How much oaktag was there in all?<br>____ sheets of oaktag | solve |

730

# SHARPENING YOUR SKILLS

its 65,66

Name: ____________ Class: ____________ Date: ________

1. Solve.

$$\frac{1}{3} + \frac{2}{6} = \square$$

ⓐ $\frac{2}{3}$ ⓒ $\frac{3}{9}$

ⓑ $\frac{4}{6}$ ⓓ $\frac{3}{6}$

2. $42 \times 10 = \square$

ⓔ 402 ⓖ 420

ⓕ 142 ⓗ Not Here

3. How much more is $\frac{2}{3}$ than $\frac{1}{4}$?

ⓐ 1 ⓒ $\frac{3}{7}$

ⓑ $\frac{5}{12}$ ⓓ $\frac{11}{12}$

4.
$$\begin{array}{r} \frac{8}{10} \\ -\frac{2}{5} \\ \hline \end{array}$$

ⓔ $\frac{1}{2}$ ⓖ $\frac{3}{10}$

ⓕ $\frac{6}{10}$ ⓗ Not Here

5. The ice cube maker in Danielle's refrigerator makes 18 ice cubes every hour. How many ice cubes can it make in 12 hours?

ⓐ 206 ⓒ 168

ⓑ 216 ⓓ 30

6. The road repair crew used $\frac{1}{2}$ barrel of tar yesterday and $\frac{1}{3}$ barrel of tar today. How many barrels of tar did they use during these 2 days?

ⓔ $\frac{5}{6}$ ⓖ $\frac{1}{6}$

ⓕ $\frac{1}{5}$ ⓗ Not Here

7. The chart shows how much time David spends exercising each week. Complete the chart. Remember! There are 52 weeks in a year.

**Time David Spends Exercising**

| Exercise | Weekly | Yearly |
|---|---|---|
| Swimming | 40 minutes | |
| Jogging | 60 minutes | |
| Bicycling | 35 minutes | |
| **Total** | | |

Unit 67

## 4.04.06 MULTIPLICATION OF A 3-DIGIT NUMBER BY A 2-DIGIT NUMBER

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.04.06.01A multiply 100, and multiples of 100, by 10 and multiples of 10;

e.g.,

$$\begin{array}{r} 200 \\ \times\ 10 \\ \hline 2{,}000 \end{array} \qquad \begin{array}{r} 200 \\ \times\ 30 \\ \hline 6{,}000 \end{array}$$

4.04.06.02A multiply any 3-digit number by 10 and multiples of 10;

e.g.,

$$\begin{array}{r} 214 \\ \times\ 10 \\ \hline 2{,}140 \end{array} \qquad \begin{array}{r} 214 \\ \times\ 20 \\ \hline 4{,}280 \end{array}$$

4.04.06.03A multiply a 3-digit number by a 2-digit number;

e.g.,

$$\begin{array}{rl} 412 & \\ \times\ 23 & \\ \hline 1{,}236 & \quad (3 \times 412) \\ +8{,}240 & \quad (20 \times 412) \\ \hline 9{,}476 & \end{array}$$

4.04.06.04A solve word problems related to skills learned in this module.

e.g.,

> Marie can type 110 words a minute. How many words can she type in 12 minutes?

**4.04.06**

## VACABULARY

### TERMS

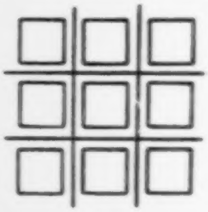
multiple
factors
product
partial product

---

### GETTING STARTED 1:

Prepare a set of multiplication fact cards. Draw a tic-tac-toe grid on the chalkboard. Tape the fact cards, face down, on the grid.

e.g.,



Divide the class into two teams X and 0. Ask a member of Team X to choose a card and display it. If the first student on Team X completes the fact correctly, an X may be written on the Tic Tac Toe grid in place of the card. If the answer is incorrect, Team 0 has a chance to answer and, if correct, may place an 0 in place of the card on the grid. Play continues, alternating teams, until one team has tic-tac-toe.

Repeat this procedure, playing the game several times, until each student has had a chance to participate.

---

### GETTING STARTED 2:

Write the following examples on the chalkboard:

$$\begin{array}{r}13\\ \underline{\times\ 3}\end{array}\qquad\begin{array}{r}21\\ \underline{\times\ 3}\end{array}\qquad\begin{array}{r}42\\ \underline{\times\ 3}\end{array}$$

Ask the students to complete the examples in their notebooks as three students work at the chalkboard. Then write the following examples on the chalkboard:

$$\begin{array}{r}13\\ \underline{\times30}\end{array}\qquad\begin{array}{r}21\\ \underline{\times30}\end{array}\qquad\begin{array}{r}42\\ \underline{\times30}\end{array}$$

Ask the students to solve these examples in their notebooks as three other students work at the chalkboard.

**GETTING STARTED 2:** cont'd

Say, "By which number did you multiply in the first group of examples?" (We multiplied by three.) By which number did you multiply in the second group of examples? (We still multiplied by three but this time the three meant three tens.) Say, "When we multiply a number by a multiple of ten, what steps must we remember to follow?" (We must remember to bring down the zero in the ones place and then to multiply by the tens digit.)

Continue this procedure using other multiplication examples with multiples of ten.

e.g.,

$$\begin{array}{rrrr}
\overset{1}{4}3 & \overset{1}{4}3 & \overset{5}{2}9 & \overset{5}{2}9 \\
\times\ 4 & \times 40 & \times\ 6 & \times 60 \\
\hline
172 & 1{,}720 & 174 & 1{,}740
\end{array}$$

$$\begin{array}{rrrr}
72 & 72 & \overset{5}{5}8 & \overset{5}{5}8 \\
\times\ 4 & \times 40 & \times\ 7 & \times 70 \\
\hline
288 & 2{,}880 & 406 & 4{,}060
\end{array}$$

**4.04.06**

**4.04.06.01** **multiply 100, and multiples of 100, by 10 and multiples of 10**

**STRATEGY 1:** Prepare and distribute squared material (hundreds) to each student or group of students. Ask ten students to come to the chalkboard and each display a hundred square. Say, "How can we find out how much they are displaying in all? (We can add 100 plus 100 plus 100 ...) How can we find the answer in a quicker way?" (We can multiply 10 times 100.) Ask a student to write this example on the chalkboard.

e.g.,

$$\begin{array}{r} 100 \\ \times\ 10 \\ \hline \end{array}$$

Say, "What is the shortcut we have learned about multiplying by 10?" (We can just add a zero to the other factor.) Ask a student to demonstrate at the chalkboard.

e.g.,

$$\begin{array}{r} 100 \\ \times\ 10 \\ \hline 1{,}000 \end{array}$$

Say, "What is the product of 10 times 100?" (The product of 10 times 100 is 1,000.) Repeat this procedure multiplying 100 and its multiples by 10.

e.g.,

$$\begin{array}{r} 400 \\ \times\ 10 \\ \hline 4{,}000 \end{array} \qquad \begin{array}{r} 500 \\ \times\ 10 \\ \hline 5{,}000 \end{array} \qquad \begin{array}{r} 900 \\ \times\ 10 \\ \hline 9{,}000 \end{array}$$

Ask twenty students to come to the chalkboard, each displaying a hundred square. Say, "How can we find the total amount displayed?" (We can add 100 twenty times or we can multiply 20 times 100.) Ask a student to write the multiplication example on the chalkboard.

e.g.,

$$\begin{array}{r} 100 \\ \times\ 20 \\ \hline \end{array}$$

**4.04.06**

**STRATEGY 1:** cont'd

Say, "What shortcut have we learned about multiplying by a multiple of ten?" (We can bring down the zero in the twenty and then multiply by 2.) Ask a student to demonstrate this at the chalkboard.

e.g.,

$$\begin{array}{r} 100 \\ \underline{\times\ 20} \\ 2{,}000 \end{array}$$

Say, "What is the product?" (The product is 2,000.) Repeat this procedure multiplying 100 and its multiples by multiples of 10. Say, "What shortcut does this pattern show us?" (We can multiply the hundreds digit by the tens digit and then add the same number of zeros to the right of the product as there are in both factors.) Ask a student to demonstrate this at the chalkboard.

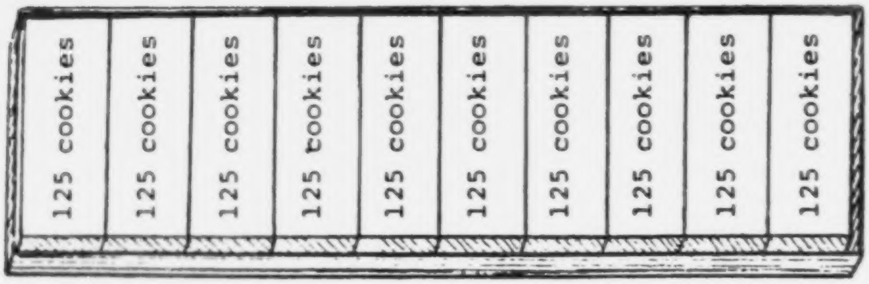
e.g.,

$$\begin{array}{r} 400 \\ \underline{\times\ 30} \\ 12{,}000 \end{array}$$

**4.04.06.02** multiply any 3-digit number by 10 and multiples of 10

**STRATEGY 1:** Draw a picture on the chalkboard showing a large carton which contains 10 boxes of cookies.

e.g.,


125 cookies
125 cookies
125 cookies
125 cookies
125 cookies
125 cookies
125 cookies
125 cookies
125 cookies
125 cookies

**STRATEGY 1:** cont'd

Say, "This large carton has 10 smaller boxes each filled with 125 cookies. How can we find out the total number of cookies packed in the large carton? (We can add the number of cookies in each box.) How else can we find the answer?" (We can multiply 10 times 125.) Ask a student to write this example on the chalkboard.

e.g.,

$$\begin{array}{rl} 125 & \text{cookies in a box} \\ \underline{\times\ 10} & \text{boxes} \end{array}$$

Say, "What shortcut have we learned for multiplying tens and hundreds by 10 and its multiples? (We bring down the zero in the ones place of the 10 or multiple of 10, and then we multiply by the digit in the tens place.) We can do the same when we multiply any number by 10 or a multiple of 10." Demonstrate at the chalkboard.

e.g.,

$$\begin{array}{r} 125 \\ \underline{\times\ 10} \\ 1{,}250 \end{array}$$

Say, "Which digit was written first in the product? (The zero in the ones place was written first.) By which number did we multiply next? (We multiplied by the 1 ten). How many cookies are in 10 boxes? (There are 1,250 cookies in 10 boxes.) How can we find the number of cookies in two cartons? (We can multiply 20 times 125.) Why would you multiply by 20? (In 2 cartons there would be 20 boxes, each with 125 cookies.) Ask a student to write and solve this example at the chalkboard as the other students do the same in their notebooks.

e.g.,

$$\begin{array}{rl} 125 & \text{cookies in a box} \\ \underline{\times\ 20} & \text{boxes in 2 cartons} \\ 2{,}500 & \text{cookies in 2 cartons} \end{array}$$

**4.04.06**

**STRATEGY 1** cont'd

Say, "Is there another way we could have found the amount of cookies in two cartons?" (We could have added 1,250 plus 1,250 or we could have multiplied 1,250 times 2.) Repeat this procedure multiplying other three digit numbers by various multiples of 10.

e.g.,

$$\begin{array}{r} 175 \\ \underline{\times\ 30} \end{array} \qquad \begin{array}{r} 245 \\ \underline{\times\ 20} \end{array} \qquad \begin{array}{r} 421 \\ \underline{\times\ 50} \end{array}$$

**4.04.06.03** **multiply a 3-digit number by a 2-digit number**

**STRATEGY 1:** Adapt Strategy 1, P.O.4.04.05.04 (p. 80S.6), for use with 3-digit multiplicands. See **Note** after Strategy 1, P.O.4.04.05.03 (p. 80S.4).

**4.04.06.04** **solve word problems related to skills learned in this module**

**STRATEGY 1:** Write the following problem on the chalkboard.

e.g.,

> Last week Mr. Smith sold 127 vanilla ice cream cones. He sold 16 times as many chocolate ice cream cones as vanilla ice cream cones. How many chocolate ice cream cones did Mr. Smith sell?

Ask a student to read the problem aloud. Say, "What are we asked to find? (We are asked to find the number of chocolate ice cream cones sold by Mr. Smith.) What information do we have? (We know how many vanilla ice cream cones he sold and we know he sold 16 times as many chocolate ice cream cones as vanilla ice cream cones.) How can we solve this problem?" (We can multiply 127 by 16.) Ask a student to write and solve the problem on the chalkboard as the other students solve it in their notebooks.

e.g.,

$$\begin{array}{r} \cancel{1}\,\cancel{4}\phantom{7} \\ 127 \\ \underline{\times\ 16} \\ 762 \\ \underline{1270} \\ 2,032 \end{array}$$

**STRATEGY 1:** cont'd

Say, "Why did you write a zero in the ones place in the second partial product? (It is a place holder which shows that we are really multiplying by 10.) How many chocolate ice cream cones were sold? (2,032 chocolate ice cream cones were sold.) This amount is 16 times greater than 127."

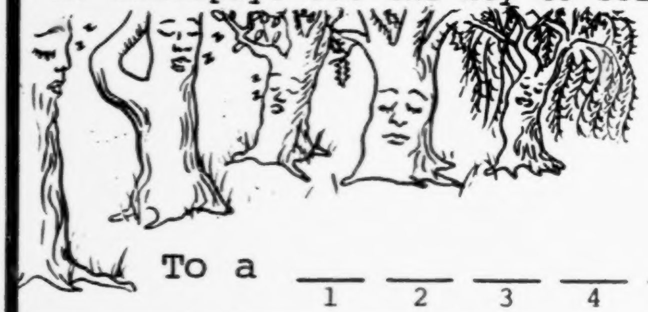
Repeat this procedure using other word problems.

P.O. 4.04.06.01 & .04

NAME: ____________________ CLASS: __________ DATE: ________

Follow the directions below.

A. Multiply. Use the key to solve the riddle.



Where does a tree go on Saturday night?

To a __ __ __ __ __ __   __ __ __ __ __
1 2 3 4 5 6 7 8 9 10 11

| | | | | | |
|---|---|---|---|---|---|
| ① $\begin{array}{r}100\\ \times\ 10\\ \hline 1{,}000\end{array}$<br>L | ② $\begin{array}{r}200\\ \times\ 10\\ \hline\end{array}$ | ③ $\begin{array}{r}300\\ \times\ 20\\ \hline\end{array}$ | ④ $\begin{array}{r}700\\ \times\ 30\\ \hline\end{array}$ | ⑤ $\begin{array}{r}500\\ \times\ 10\\ \hline\end{array}$ | ⑥ $\begin{array}{r}600\\ \times\ 20\\ \hline\end{array}$ |

| | | | | |
|---|---|---|---|---|
| ⑦ $\begin{array}{r}700\\ \times\ 10\\ \hline\end{array}$ | ⑧ $\begin{array}{r}300\\ \times\ 30\\ \hline\end{array}$ | ⑨ $\begin{array}{r}300\\ \times\ 40\\ \hline\end{array}$ | ⑩ $\begin{array}{r}400\\ \times\ 10\\ \hline\end{array}$ | ⑪ $\begin{array}{r}900\\ \times\ 30\\ \hline\end{array}$ |

Key

| A | B | E | L | M | P | R | T | U | Y |
|---|---|---|---|---|---|---|---|---|---|
| 9,000 | 21,000 | 5,000 | 1,000 | 6,000 | 7,000 | 12,000 | 4,000 | 2,000 | 27,000 |

B. Solve the problem below.

Three hundred barrels of oil were delivered to the Acme Oil Company. Each barrel holds 50 gallons of oil. How many gallons of oil were delivered?

________ gallons

**solve**

Do you remember?

$\begin{array}{r}3.9\\ -1.2\\ \hline\end{array}$   $\begin{array}{r}4.25\\ +1.16\\ \hline\end{array}$   $\begin{array}{r}8.4\\ -2.15\\ \hline\end{array}$   $\begin{array}{r}6.43\\ +2.9\\ \hline\end{array}$   $\begin{array}{r}14.06\\ -\ 3.21\\ \hline\end{array}$

P.O. 4.04.06.02 & .04

NAME:____________________ CLASS:________ DATE:________

Follow the directions below.

A. Complete each example.

| | | | |
|---|---|---|---|
| ①<br>215<br>x 20 | ②<br>324<br>x 30 | ③<br>705<br>x 50 | ④<br>553<br>x 10 |
| ⑤<br>816<br>x 40 | ⑥<br>279<br>x 10 | ⑦<br>571<br>x 20 | ⑧<br>749<br>x 10 |
| ⑨<br>366<br>x 30 | ⑩<br>641<br>x 60 | ⑪<br>928<br>x 50 | ⑫<br>109<br>x 80 |

B. Solve the problems below.

| | |
|---|---|
| 1. A box contains 144 pencils. How many pencils will there be in 40 boxes?<br>________ pencils | **solve** |
| 2. Mr. Carter drives a total of 315 miles to and from work each week. How many miles does he travel in 10 weeks?<br>________ miles | **solve** |

P.O. 4.04.06.03-.04

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

A. Complete each example below.

| ① | ② | ③ | ④ |
|---|---|---|---|
| 318<br>x 52 | 194<br>x 83 | 563<br>x 34 | 435<br>x 28 |

| ⑤ | ⑥ | ⑦ | ⑧ |
|---|---|---|---|
| 756<br>x 65 | 225<br>x 15 | 624<br>x 25 | 845<br>x 72 |

B. Solve the problems below.

1. There are 27 packages of dinner napkins on the supermarket shelf. If there are 125 napkins in each package, how many napkins are there in all?

__________ napkins

solve

2. Find the area of a field that is 243 feet long and 29 feet wide.

__________ sq. ft.

solve

## 4.05.07 DIVISION OF 2- AND 3-DIGIT DIVIDENDS BY MULTIPLES OF 10 AS DIVISORS

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.05.07.01A divide a 2-digit dividend by 10 or a multiple of 10 and check;

e.g.,

$$\begin{array}{r} 3 \text{ R2} \\ 20\overline{)62} \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 20 \\ \underline{\times\ 3} \\ 60 \\ \underline{+\ 2} \\ 62 \end{array}$$

4.05.07.02A divide a 3-digit dividend by 10 or multiples of 10 and check;

e.g.,

$$\begin{array}{r} 22 \text{ R5} \\ 30\overline{)665} \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 22 \\ \underline{\times 30} \\ 660 \\ \underline{+\ \ 5} \\ 665 \end{array}$$

4.05.07.03A solve word problems related to skills learned in this module.

e.g.,

> The bakery packs 10 cookies to a box. How many boxes are needed to pack 340 cookies?

**4.05.07**

## VOCABULARY

| TERMS | SYMBOLS |
|---|---|
| remainder | R |
| divisor | |
| dividend | |
| quotient | |

---

## GETTING STARTED 1:

Prepare and display a division example.
e.g,.

```
    3)428
```

Ask the students to write this example in their notebooks. Say, "What would you estimate the quotient to be? (My estimate of the quotient is 100.) How did you arrive at that estimate?" (I divided the 4 in the hundreds place by 3. The quotient in the hundreds place is 1. Therefore, I know the answer will be at least 100 but not as great as 200.) Ask a student to write the estimate on the chalkboard.

Ask the students to complete the division example in their notebooks as one student completes it on the chalkboard.
e.g.,

```
   142 R2                        142 R2
 3)428                         3)428
  -300    (3 x 100)             -3↓|
   128                 or        12|
  -120    (3 x 40)              -12↓
     8                           08
    -6    (3 x 2)               - 6
     2                            2
```

Say, "What is the quotient? (The quotient is 142 remainder 2.) Is that answer reasonable? Explain. (The answer is close to our estimate of 100. Therefore, it is reasonable.) How can we check the quotient?" (We can multiply the quotient by the divisor and add the remainder. The result should be the dividend.) Ask a student to write the check on the chalkboard as the other students write it in their notebooks.

**GETTING STARTED 1:** cont'd

e.g.,

$$\begin{array}{r}\underline{\text{check}}\\ 142\\ \underline{\times\ \ 3}\\ 426\\ \underline{+\ \ 2}\\ 428\end{array}$$

Repeat this procedure with other division examples having 1-digit divisors.

---

**GETTING STARTED 2:**

Prepare and display the following open sentences:

$$\begin{array}{lll} 10 \times 23 = \boxed{\phantom{00}} & \qquad & 10 \times 86 = \boxed{\phantom{00}}\\ \boxed{\phantom{00}} \times 47 = 470 & & 10 \times \boxed{\phantom{00}} = 610\\ 10 \times \boxed{\phantom{00}} = 520 & & \boxed{\phantom{00}} \times 35 = 350 \end{array}$$

Say, "What is the shortcut for multiplying by ten?" (When a number is multiplied by ten, we can place a zero to the right of that given number to get the product.) Ask the students to use this information to complete the open sentences in their notebooks as two students complete them at the chalkboard.

$$\begin{array}{lll} 10 \times 23 = \boxed{230} & \qquad & 10 \times 86 = \boxed{860}\\ \boxed{10} \times 47 = 470 & & 10 \times \boxed{61} = 610\\ 10 \times \boxed{52} = 520 & & \boxed{10} \times 35 = 350 \end{array}$$

Write the following examples on the chalkboard.

$$\begin{array}{rrrrrr} 31 & 12 & 11 & 33 & 45 & 62\\ \underline{\times 20} & \underline{\times 40} & \underline{\times 50} & \underline{\times 20} & \underline{\times 50} & \underline{\times 30} \end{array}$$

Say, "What shortcut do you know for multiplying by multiples of ten?" (We begin by writing a zero in the ones place in the product. Then, we multiply by the digit in the tens place.) Ask several students to complete the examples at the chalkboard as the other students complete them in their notebooks.

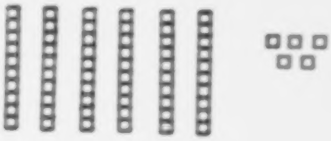
Repeat this procedure by multiplying other numbers by 10 and multiples of 10.

**4.05.07**

**4.05.07.01** **divide 2-digit dividends by 10 or a multiple of 10 and check**

**STRATEGY 1:** Prepare and distribute squared material (tens and ones). On the chalkboard write: $20\overline{)65}$. Ask a student to read the example aloud. Say, "Use your squared material to model 65." Ask a student to model 65 on the chalkboard.

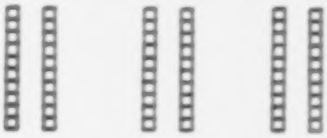
e.g.,



$20\overline{)65}$

Say, "How can we find the quotient? (We can divide the squared material into groups of 20 or we can divide it into 20 equal groups.) Which will be easier to do?" (It will be easier to divide the squared material into groups of 20 and see how many groups we can make.) Ask the students to divide using the squared material.

e.g.,



Say, "How many groups of 20 did you make?" (We made 3 groups of 20.) Ask a student to write a 3 in the ones place in the quotient. Say, "How much of the squared material was used in the 3 groups of 20? (We used 6 tens, or 60.) How can we show this in the example?" (We can multiply 3 times 20.) Ask a student to show this in the example on the chalkboard as the other students do the same in their notebooks.

e.g.,

$$\begin{array}{r} 3 \\ 20\overline{)65} \\ \underline{60} \end{array} \quad (20 \times 3)$$

Say, "How much squared material is left to divide? (5 ones are left.) How can we show this in our example?" (We can subtract the 60 from 65.) Ask a

**STRATEGY 1:** cont'd

student to show this in the example on the chalkboard as the other students do the same in their notebooks.

e.g.,

$$\begin{array}{r} 3 \\ 20\overline{)65} \\ \underline{60} \end{array} \quad (20 \times 3)$$

Say, "Can 5 be divided into groups of 20? Explain. (No, 5 is less than 20.) What will we do with the 5 ones that are left over?" (We will call the left over ones the remainder and write R5 to the right of the quotient.) Ask a student to show this at the chalkboard as the other students do the same in their notebooks.

e.g.,

$$\begin{array}{r} 3\ \text{R5} \\ 20\overline{)65} \\ \underline{-60} \\ 5 \end{array} \quad (20 \times 3)$$

Say, "What is the answer? (65 divided by 20 equals 3 remainder 5.) How can we check our work?" (We can check our work by multiplying the quotient, 3, by the divisor, 20, and adding the remainder to it. The result should be the dividend, 65.) Ask a student to write the check on the chalkboard as the other students do the same in their notebooks.

e.g.,

$$\begin{array}{r} \underline{\text{check}} \\ 20 \\ \underline{\times\ 3} \\ 60 \\ \underline{+\ 5} \\ 65 \end{array}$$

Repeat this procedure by dividing other 2-digit numbers by 10 and multiples of 10.

**STRATEGY 2:** Write the following division example on the chalkboard: $10\overline{)83}$.

**STRATEGY 2:**
cont'd

Ask the students to write the example in their notebooks. Say, "How can we find out how many tens there are in 83? (Accept reasonable responses, e.g., We can think of 83 as 8 tens and 3 ones. We can count by tens until we come as close as possible to 83 without going beyond 83...) How many tens are in 83? (There are 8.) Ask a student to write 8 in the ones column in the quotient as the other students write in in their notebooks. Say, "Why didn't we write the 8 in the tens column? (8 in the tens column would mean 80. We want to represent 8.) After we write a digit in the quotient, how can we see how much of the dividend we have already divided?" (We can multiply the divisor by the digit in the quotient.) Ask a student to show the multiplication on the chalkboard as the other students write it in their notebooks.

e.g.,

$$\begin{array}{r} 8 \\ 10\overline{)83} \\ \underline{-80} \end{array}$$

Say, "We have used 8 groups of 10, or 80. How can we find out how much is left to divide?" (We can subtract 80 from 83.) Ask a student to show this on the chalkboard as the other students do the same in their notebooks.

e.g.,

$$\begin{array}{r} 8 \\ 10\overline{)83} \\ \underline{-80} \\ 3 \end{array}$$

Say, "Can 3 be divided by 10? Explain. (No, 3 is less than 10.) How can we write about the 3 ones that are left over?" (We can call the 3 ones a remainder and write R5 next to the quotient.) Ask a student to show this on the chalkboard as the other students do the same in their notebooks. Say, "What is the answer? (The answer is 8 remainder 3.) How can we check the answer?" (We can multiply the

**STRATEGY 2:** cont'd

divisor by the quotient and add the remainder. The result should be the dividend.) Ask a student to write the check on the chalkboard as the other students write it in their notebooks.

e.g.,

$$\begin{array}{r} 8\ \text{R3} \\ 10\overline{)83} \\ \underline{-80}\ \ (8 \times 10) \\ 3 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 10 \\ \underline{\times\ 8} \\ 80 \\ \underline{+\ 3} \\ 83 \end{array}$$

Repeat this procedure by dividing other 2-digit dividends by ten or multiples of ten.

**4.05.07.02** **divide 3-digit dividends by 10 or multiples of ten and check**

**STRATEGY 1:** Adapt Strategy 1, P.O. 4.05.07.01, for use with 3-digit dividends.

**STRATEGY 2:** Adapt Strategy 2, P.O. 4.05.07.01, for use with 3-digit dividends.

**4.05.07.03** **solve word problems related to skills learned in this module**

**STRATEGY 1:** Prepare and display a problem on the chalkboard.

e.g.,

> 240 students will go on a trip. If there will be 20 students on each bus, how many buses will be needed?

Ask a student to read the problem aloud. Say, "What must we find? (We must find the number of buses needed for 240 students if 20 students ride on each bus.) How can we find this?" (We can divide 240 by 20.) Ask a student to write the example on the

**STRATEGY 1:** cont'd

chalkboard, e.g., $20\overline{)240}$. Say, "Can 2 hundreds be divided into groups of 20 hundreds each? Explain. (No, we must exchange the 2 hundreds for 20 tens and combine them with the 4 tens for a total of 24 tens.) How many groups of 20 tens each can be made from 24 tens? (1 group of 20 tens can be made.) Where should we write the 1?" (We should write it in the tens place in the quotient because we are dividing the tens.) Ask a student to write a 1 in the tens place in the quotient. Say, "With a 1 in the tens place, what is your estimate of the quotient?" (The answer is between 10 and 20.)

Ask a student to complete the example on the chalkboard as the other students complete it in their notebooks. e.g.,

```
    12                                12
20)240                            20)240
  -200     (20 x 10)      or        -20↓
    40                                40
   -40     (20 x 2)                  -40
     0                                 0
```

Say, "What is the quotient? (The quotient is 12.) What is the answer to the problem? (12 buses are needed.) How can we check the quotient?" (We can multiply 12 times 20. The result should be 240.) Ask a student to show the check on the chalkboard as the other students do the same in their notebooks. e.g.,

```
check
   20
  x12
   40
 +200
  240
```

Repeat this procedure using other word problems.

P.O. 4.05.07.01 & .03

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

A. Find the quotients and check.

① $10\overline{)45}$ **check**

② $10\overline{)79}$ **check**

③ $30\overline{)62}$ **check**

④ $40\overline{)92}$ **check**

⑤ $20\overline{)86}$ **check**

⑥ $50\overline{)68}$ **check**

B. Solve the problems.

1. Jerry had 80 pennies. He made stacks of 20 pennies each. How many stacks did he make?

   He made ____ stacks.

   **solve** **check**

2. Mandy baked 44 cookies. If she puts 10 cookies on each plate, how many plates will she need? How many cookies will be left over?

   She will need ____ plates.

   There will be ____ cookies left over.

   **solve** **check**

P.O. 4.05.07.02-.03

NAME: ____________________ CLASS: __________ DATE: __________

Follow the directions below.

A. Find the quotients and check.

| | |
|---|---|
| ① $10\overline{)360}$ **check** | ② $10\overline{)592}$ **check** |
| ③ $40\overline{)441}$ **check** | ④ $30\overline{)965}$ **check** |
| ⑤ $50\overline{)605}$ **check** | ⑥ $80\overline{)892}$ **check** |

B. Solve the problems below.

| | | |
|---|---|---|
| 1. There are 320 beads. If 10 beads are placed on each bracelet, how many bracelets can be made?<br>____ bracelets | **solve** | **check** |
| 2. There are 480 students in the auditorium. If 20 students sit in each row, how many rows of students are there?<br>____ rows | **solve** | **check** |

Unit 69

## 4.05.08 DIVISION OF 2- AND 3-DIGIT DIVIDENDS BY 2-DIGIT DIVISORS

(1-2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

4.05.08.01A divide a 2-digit dividend by a 2-digit divisor and check;

e.g.,

$$\begin{array}{r} 4 \\ 12\overline{)48} \end{array}$$

check

$$\begin{array}{r} 12 \\ \underline{\times 4} \\ 48 \end{array}$$

4.05.08.02A divide a 3-digit dividend by a 2-digit divisor and check;

e.g,.

$$\begin{array}{r} 78 \text{ R6} \\ 11\overline{)864} \end{array}$$

check

$$\begin{array}{r} 78 \\ \underline{\times 11} \\ 78 \\ \underline{780} \\ 858 \\ \underline{+ \quad 6} \\ 864 \end{array}$$

4.05.08.03A solve word problems related to skills learned in this module.

e.g.,

The baker at the donut shop baked 264 donuts. She put them in boxes of 12 donuts each. How many boxes were needed?

## VOCABULARY

| TERMS | SYMBOLS |
|---|---|
| remainder | R |
| divisor | |
| dividend | |
| quotient | |
| estimate | |
| round | |

---

## GETTING STARTED 1:

Prepare and display several open multiplication and division number sentences on the chalkboard.

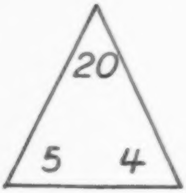
e.g.,

7 x ☐ = 56 8 x ☐ = 48 9 x ☐ = 63
56 ÷ 7 = ☐ 48 ÷ 8 = ☐ 63 ÷ 9 = ☐

Say, "We can review division facts by using our multiplication facts. How does knowing the multiplication facts help us know the division facts?" (We can see how the pairs are related and how each pair may be completed by using the same numeral.) Ask several students to come to the chalkboard to complete the open sentences as the other students work in their notebooks.

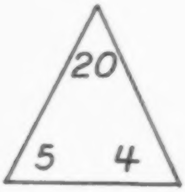
Draw a triangle on the chalkboard. Inside the triangle, write three related numerals for multiplication and division facts.

e.g.,



Say, "Use the numerals in the triangle to write two multiplication sentences and two division sentences." Ask a student to work at the chalkboard as the other students work in their notebooks.

e.g.,

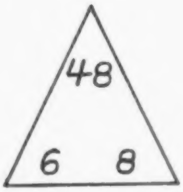


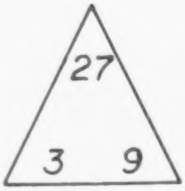
5 x 4 = 20 20 ÷ 4 = 5
4 x 5 = 20 20 ÷ 5 = 4

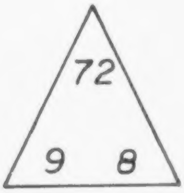
## GETTING STARTED 1: cont'd

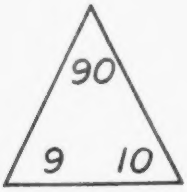
Repeat this procedure using related numerals written inside other triangles.

e.g.,









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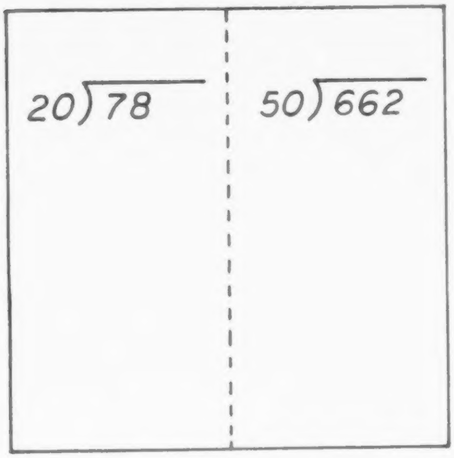
## GETTING STARTED 2:

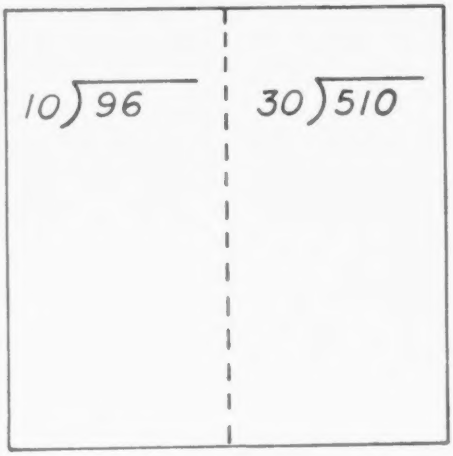
Prepare several sheets of paper with four division examples on each. The divisor, in each case, should be 10 or a multiple of 10.

e.g.,

Front



Back



Divide the students into small groups and give each group a division paper. Say, "Each group must complete the examples on the page." When all the groups have finished, ask each group to exchange papers with another group and check their work. Say, "If you find an example solved incorrectly, a member of your group will have a chance to complete it correctly on the chalkboard."

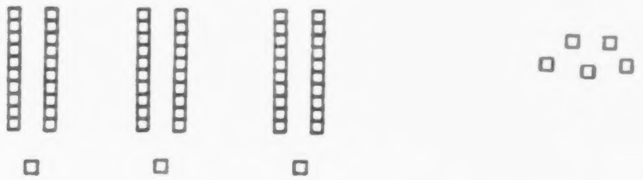
4.05.08

**4.05.08.01** **divide 2-digit dividends by a 2-digit divisor and check**

**STRETEGY 1:** Prepare and distribute squared material (tens and ones.) On the chalkboard write: $21\overline{)68}$. Ask the students to write the example in their notebooks. Say, "How can we complete this example? (We can divide 68 into groups of 21 or we can divide it into 21 equal groups.) Which is easier to do with our squared material? (It is easier to divide 68 into groups of 21.) Before we divide, let's estimate what the quotient will be. To estimate, we can round the divisor to the nearest ten. What is 21 rounded to the nearest ten? (21 rounds to 20.) We can find out how many groups of 20 are in 68 by counting by twenty until we come as close as we can to 68 without going over. Counting by twenty is just like counting by two, with an extra zero to the right of each number We say, $2\underline{0}$, $4\underline{0}$, $6\underline{0}$, $8\underline{0}$ ... How many twenties are in 68? (There are 3 twenties in 68.) A good estimate of our answer is 3."

Say, "Now let's use our squared material to solve the example. Represent 68 with your squared material. Then separate your squared material into groups of 21."

e.g.,



Say, "How many groups of 21 did you make?" (We made 3 groups of 21.) Ask a student to write 3 in the ones place in the quotient. Say, "How much of the squared material did we use in forming 3 groups of 21? (We used 6 tens and 3 ones, or 63.) How much is left to be divided? (5 ones are left to be divided.)

**STRATEGY 1:** cont'd

How can we show this in our example?" (We can multiply the quotient, 3, times the divisor, 21 and subtract this product from 68.) Ask a student to show this in the example on the chalkboard as the other students do the same in their notebooks.

e.g.,

$$\begin{array}{rl} 3 & \\ 21\overline{)68} & \\ -63 & (21 \times 3) \\ \cline{1-1} 5 & \end{array}$$

Say, "Can 5 be divided into groups of 21? Explain. (No, 5 is less than 21.) What will we do?" (We will call the 5 a remainder and write it next to the 3 in the quotient.) Ask a student to show this in the example on the chalkboard as the other students do the same in their notebooks.

e.g.,

$$\begin{array}{rl} 3 & \text{R5} \\ 21\overline{)68} & \\ -63 & (21 \times 3) \\ \cline{1-1} 5 & \end{array}$$

Say, "What is the answer? (The answer is 3 remainder 5.) How can we check our work?" (We can multiply the quotient, 3, times the divisor, 21, and add the remainder. The result should be the dividend.) Ask a student to show the check at the chalkboard as the other students do the same in their notebooks.

e.g.,

check

$$\begin{array}{r} 21 \\ \times\ 3 \\ \hline 63 \\ +\ 5 \\ \hline 68 \end{array}$$

Repeat this procedure with other similar examples.

**STRATEGY 2:** Display the following example: $32\overline{)89}$.

Ask the students to write it in their notebooks. Say, "How can we estimate the quotient? (We can round 32 to 30 and round 89 to 90. Then we can think of how many groups of 30 are in 90?) How many groups of 30 are in 90?" (There are 3 groups of 30 in 90.) On the chalkboard write: estimate = 3. Say, "Our estimate is a good place to start. We can try 3 as the number of groups of 32 in 89." Ask the students to multiply 32 times 3 to see if 3 is an appropriate quotient.

Say, "Is 3 the quotient? Explain. (No, 3 is too large because 3 groups of 32 equal 96 and we only have 89 to divide.) What should we do?" (We should try 2 as the quotient.) Ask a student to repeat this procedure using 2 as the quotient as the other students work in their notebooks.

e.g.,

$$\begin{array}{r} 2 \\ 32\overline{)89} \\ \underline{64} \end{array}$$

Say, "Is 2 an appropriate quotient? Explain. (Yes, 2 times 32 is 64, which is less than 89.) Subtract to see how much is left to divide."

e.g.,

$$\begin{array}{r} 2 \\ 32\overline{)89} \\ \underline{-64} \\ 25 \end{array}$$

Say, "How much is left to divide? (25 is left to divide.) Can we divide 25 by 32? Explain. (No, 25 is less than 32.) What can we do with the 25? (We can call it the remainder.) What do you know about any remainder?" (It must always be less than the divisor.)

**STRATEGY 2: cont'd** Ask a student to complete the example on the chalkboard as the other students write it in their notebooks.

e.g.,

$$\begin{array}{r} 2\ \text{R25} \\ 32\overline{)89} \\ -64 \\ \hline 25 \end{array}$$

Say, "How can we check our answer?" (We can multiply the quotient times the divisor and add the remainder to see if the result equals the dividend.) Ask a student to show the check on the chalkboard as the other students write it in their notebooks.

e.g.,

check

$$\begin{array}{r} 32 \\ \times\ 2 \\ \hline 64 \\ +25 \\ \hline 89 \end{array}$$

Repeat this procedure using similar examples.

**4.05.08.02** **divide 3-digit dividends by a 2-digit divisor and check**

**STRATEGY 1:** Adapt Strategy 1, P.O. 4.05.08.01, using 3-digit dividends and squared material through hundreds.

**STRATEGY 2:** Adapt Strategy 2, P.O. 4.05.08.01, using 3-digit dividends.

**4.05.08.03** **solve word problems related to skills learned in this module**

**STRATEGY 1:** Write the following word problem on the chalkboard:

> Joan has 365 marbles. She wants to divide them equally among 12 boxes. How many marbles will be in each box?

**STRATEGY 1:** cont'd

Ask a student to read the problem aloud. Say, "How can we solve this problem? (We can divide 365 by 12.) How do you know that division is a good way to solve this problem?" (When we want to separate an amount into smaller, equal groups, we divide.) Ask a student to write the example needed to solve the problem on the chalkboard, e.g., $12\overline{)365}$. Say, "How can we find the quotient?" (We can use squared material to represent 365 and divide the squared material into 12 groups of equal size. We could also round the divisor and dividend, estimate the quotient, and then solve the example.)

Ask the students to find the quotient and check as one student works at the chalkboard.

e.g.,

```
     30 R5                        30 R5     check
12)365              or       12)365          12
  -360  (12 x 30)              -36↓         x30
     5                          05          360
    -0  (12 x 0)               -  0        +  5
     5                            5         365
```

Say, "How many marbles will be in each box?" (There will be 30 marbles in each box.) How many marbles will not be in a box? (The 5 marbles left over will not be in a box.) How could we have solved this problem if we did not know how to divide?" (We could have subtracted groups of 12 from 365 until we could no longer subtract groups of 12. Then we would have to count how many groups of 12 we subtracted.)

Repeat this procedure with other word problems.

P.O. 4.05.08.01 & .03

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

A. Divide and check.

① $15\overline{)64}$ **check**

② $11\overline{)95}$ **check**

③ $22\overline{)78}$ **check**

④ $31\overline{)93}$ **check**

⑤ $41\overline{)77}$ **check**

⑥ $28\overline{)84}$ **check**

B. Solve the problem below. Check your answer.

① Sue collected 90 pine cones for her nature study class. If she puts 15 pine cones in each bag, how many bags will she need?

__________ bags

**solve** **check**

② Randy picked 78 daisies. If he places 12 daisies in each vase, how many vases will he fill?

He will fill __________ vases.

There will be ____ extra daisies.

**solve** **check**

P.O. 4.05.08.02-.03

NAME:____________________ CLASS:________ DATE:________

Follow the directions below.

A. Divide and check.

① $11\overline{)135}$ **check**

② $25\overline{)650}$ **check**

③ $34\overline{)378}$ **check**

④ $28\overline{)570}$ **check**

⑤ $19\overline{)399}$ **check**

⑥ $41\overline{)945}$ **check**

B. Solve the problem below.

A box of cereal weighs 252 grams. If one serving of cereal weighs 21 grams, how many servings does the box of cereal contain?

____ servings

**solve** **check**

Do you remember?

The least common multiple of 3 and 4 is ________.

The least common multiple of 4 and 6 is ________.

The least common multiple of 5 and 7 is ________.

# SHARPENING YOUR SKILLS

Units 67, 68, 69

Name: ____________________ Class: ____________ Date: ________

1.
$$\begin{array}{r}300\\ \times\ 40\\ \hline\end{array}$$

ⓐ 1,200 ⓒ 120

ⓑ 12,000 ⓓ Not Here

2.
$$\begin{array}{r}436\\ \times\ 50\\ \hline\end{array}$$

ⓔ 2,180 ⓖ 21,800

ⓕ 20,500 ⓗ Not Here

3. Find the product.

$$\begin{array}{r}217\\ \times\ 33\\ \hline\end{array}$$

4. $10\overline{)830}$

ⓐ 8 R3 ⓒ 83 R3

ⓑ 80 R3 ⓓ Not Here

5. $21\overline{)448}$

ⓔ 20 R8 ⓖ 21 R7

ⓕ 22 ⓗ Not Here

6. A bakery delivered 420 cookies in boxes of 10 cookies each. How many boxes of cookies were delivered?

_____ boxes of cookies

7. There are 144 pencils in a box. How many pencils will be in a dozen boxes?

______ pencils

8. The book Nat is reading has 180 pages. If Nat reads 15 pages each day, how many days will it take him to finish the book?

______ days

9. Sandy has 624 pennies. If she makes stacks of 20 pennies each, how many stacks can she make? How many pennies will be left over?

______ stacks

______ pennies left over

## 4.09.06 SYMMETRY

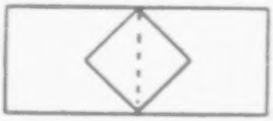
(1 lesson)

### PERFORMANCE OBJECTIVES

The student will be able to...

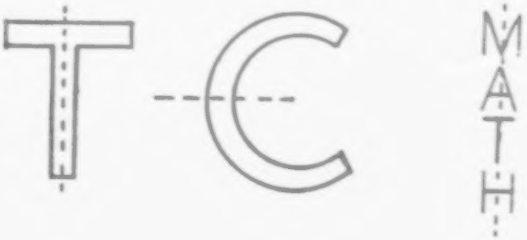
4.09.06.01A recognize lines of symmetry in geometric shapes;

e.g.,



*4.09.06.02A recognize lines of symmetry in objects other than geometric shapes.

e.g.,



## VOCABULARY

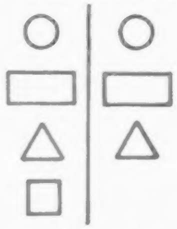
### TERMS

symmetry
symmetrical

---

## GETTING STARTED 1:

Prepare felt cutouts of geometric shapes for the flannel board (two of each shape), paper, and attribute blocks. Distribute the paper and attribute blocks to groups of students. Ask the students to fold their papers in half. Display the following on the flannel board or draw it on the chalkboard:



Ask the students to arrange their attribute blocks the same way on their papers, or to draw the shapes on their papers. Say, "How are the shapes on both halves of your paper the same? (They both have a circle, a rectangle and a triangle.) What is different about these designs? (The right side is missing a square.) How can you make the designs exactly the same?" (We can place a square below the triangle.) Ask the students to do this using their attribute blocks as you draw it on the chalkboard.

Repeat this procedure to make other matching designs.

---

## GETTING STARTED 2:

Prepare and display several words which are palindromes.
e.g.,

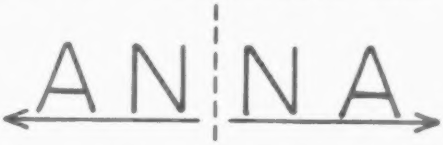
MOM, ANNA, POP, DAD

Ask the students to read the words and write them in their notebooks. Say, "What is special about these words? (Whether we read them forward or backward, they read the same.) For this to be true, there must be a middle point from which everything, on both sides of the point, is the same. Look at the word **MOM**. The middle point is the letter, O. The letters on both sides of the O are the same. What are they? (They are both the letter, M.) Where is the

## GETTING STARTING 2: cont'd

middle point in the name **ANNA**? (The middle point is between the two N's.) If you read both parts, starting from the middle, you have NA on both sides." Demonstrate this on the chalkboard.

e.g.,



Say, "Starting from the middle and reading outward in both directions, the parts are the same. Of course, it is necessary to read the left side backward."

Ask the students to find other words that read the same backward and forward and to find the middle point of each. Students should be aware that, in some words, the middle point is between a pair of matching letters.

e.g.,

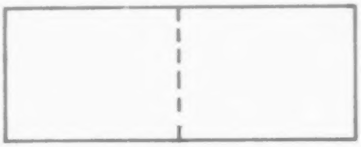
did
madam
radar
noon
bid
tot

**4.09.06**

**4.09.06.01** **recognize lines of symmetry in geometric shapes**

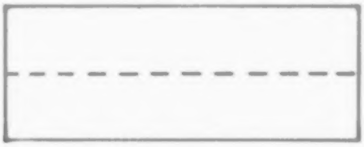
**STRATEGY 1:** Prepare and distribute paper rectangles, squares, circles, and triangles to each student. Display a rectangle. Ask the students to select a rectangle and place it on their desks. Say, "What shape is this? (This is a rectangle.) Fold the rectangle in half." Demonstrate.

e.g.,



Say, "Are the halves the same size? Explain. (Yes, they are both one-half of the rectangle.) Open your rectangle. Look at the fold line in the middle. Use your pencil to draw a line along the fold line." This line is called a line of symmetry." Write on the chalkboard and say, "A line of symmetry divides an object or a figure into two parts that are the same." Ask the students to write this definition in their notebooks. Say, "How can we be sure that both parts are the same? (We can place one part on top of the other. If all the edges line up, they are the same.) We can say that these parts or pieces are symmetrical. Now use a different rectangular paper to find another line of symmetry."

e.g.,

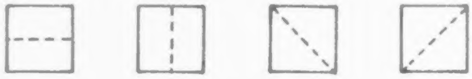


Say, "Some shapes can have more than one line of symmetry."

**STRATEGY 1:** cont'd

Display a square. Ask the students to find lines of symmetry by folding their squares.

e.g.,



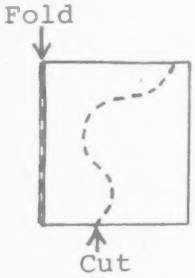
Say, "How many lines of symmetry does a square have?" (A square has 4 lines of symmetry.)

Repeat this procedure using paper circles and triangles to find lines of symmetry.

**STRATEGY 2:**

Prepare tracing paper, drawing paper, and scissors. Distribute drawing paper and scissors to each student. Ask the students to fold their papers in half. Say, "Keeping the paper folded, cut a shape out of this paper. Do not cut the fold." Demonstrate.

e.g.,



Say, "Open your paper and look at it. What can you say about the shapes on each side of the fold line? (The two parts are the same.) If we can fold a figure into two matching parts, that fold line is called a line of symmetry. We can say that the two parts into which the figure is divided are the same, or symmetrical."

Draw several shapes on the chalkboard.

e.g.,

Say, "How can we use tracing paper to find lines of symmetry in these shapes?" (We can trace over each figure. Then we can fold the tracing of the figure in the middle and see if both sides match.) Ask several

**STRATEGY 2:** cont'd

students to trace the figures and find lines of symmetry. Other student may then try to find other lines of symmetry in these same figures. Repeat this procedure using other shapes.

**4.09.06.02** **recognize lines of symmetry in objects other than geometric shapes**

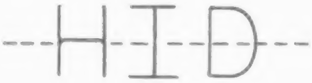
**STRATEGY 1:**

Prepare and distribute workbook page 84b or ask the students to open their workbooks to that page. Say, "What is a line of symmetry?" (It is a line which cuts a shape or a figure into two parts that are the same. When we fold a shape over a line of symmetry, the two parts match perfectly.) Write the letter, A on the chalkboard. Ask a student to find a line of symmetry for the letter, A, e.g., . Say, "What have we found? (We have found that A has a vertical line of symmetry.) Write the letter, G on the chalkboard. Ask a student to find a line of symmetry for the letter, G. Say, "What have we found? (We cannot find a line of symmetry for the letter, G. Wherever we draw a line, the parts on both sides of the line are not the same.) Therefore, not every letter has a line of symmetry. Does the letter O have a line of symmetry? (The letter O has several lines of symmetry.) Explain. (The letter O can have horizontal, vertical, or diagonal lines of symmetry.) Some letters have several lines of symmetry, some have only one, and some have none. Look at the letters printed on page 84b. Try to find a line of symmetry for each of the letters."

When the students have completed their work, ask them to share their results with their classmates and to list, in their notebooks, the letters which have lines of symmetry. Ask the students to use the letters which are symmetrical to form words which are symmetrical and to draw the lines of symmetry.

**STRATEGY 1:** cont'd

e.g.,



Say, "Is it necessary for lines of symmetry to be drawn in any particular direction?" (No, the lines can be drawn in any direction as long as they divide the objects into two parts that are the same.)

**STRATEGY 2:** Prepare and distribute magazines and scissors to each group of students. Say, "What do we know about lines of symmetry? (Lines of symmetry divide something into two parts that are the same.) What can we say about two parts of an object which can be divided by a line of symmetry? (We can say the two parts are symmetrical.) What do we see if we fold a paper along its line of symmetry?" (We see only one half of the paper because that half covers the other half completely.)

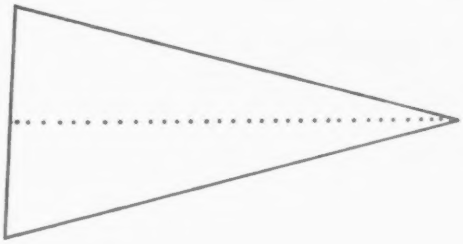
Say, "Look through the magazines. Find pictures of objects which are symmetrical. When you find one, cut it out carefully and fold it to see if it is symmetrical. If it is, use your pencil to trace over the line of symmetry." When the students have completed their work, ask them to display the pictures they have found. Say, "How do you know your picture has a line of symmetry?" (When I fold the picture on the line of symmetry the two parts are the same.)

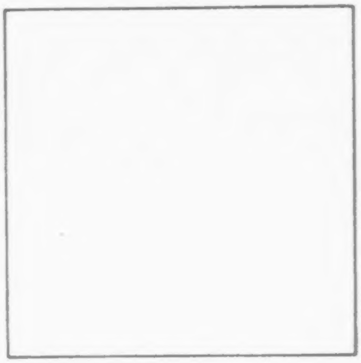
Prepare a bulletin board comprised of the pictures which the students have found.

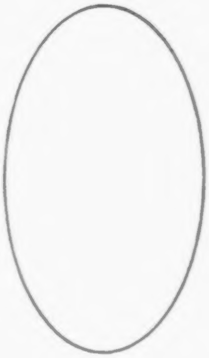
P.O. 4.09.06.01

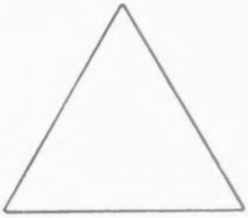
NAME: ____________________ CLASS: __________ DATE: __________

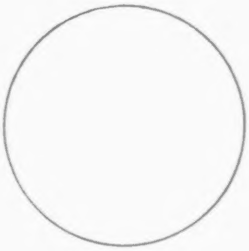
Draw one or more lines of symmetry for each shape.

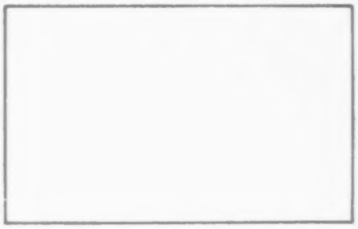


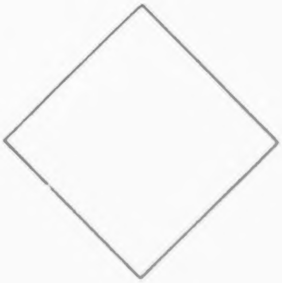


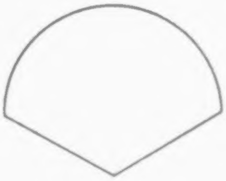


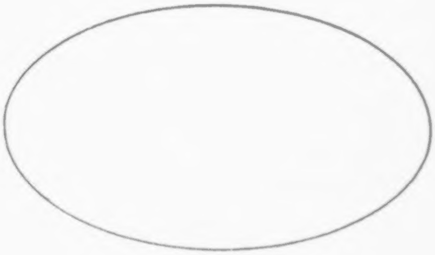


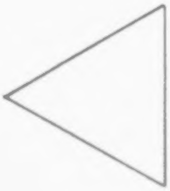


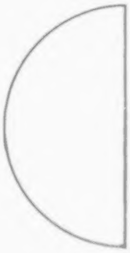


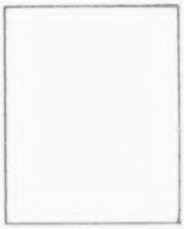


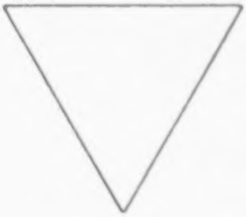












P.O. 4.09.06.02

NAME:____________________ CLASS:________ DATE:________

Find the letters which have lines of symmetry. Draw the line of symmetry.

A B C D E F

G H I J K L M

N O P Q R S T

U V W X Y Z

**CHALLENGE!** Print two more words that have a line of symmetry. Draw the line of symmetry.

-B-E-D--

__________

__________

## 4.09.07 COORDINATE GEOMETRY

(1-2 lessons)

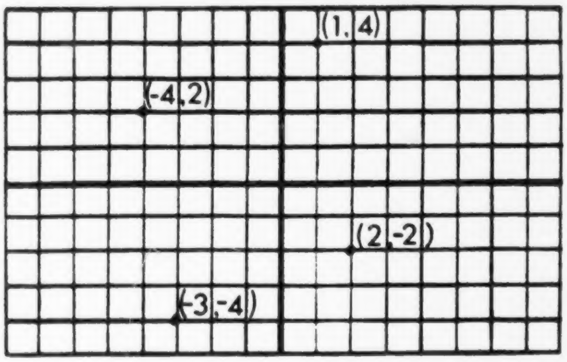
### PERFORMANCE OBJECTIVES

The student will be able to...

4.09.07.01A locate positive and negative coordinates on a grid;

e.g.,

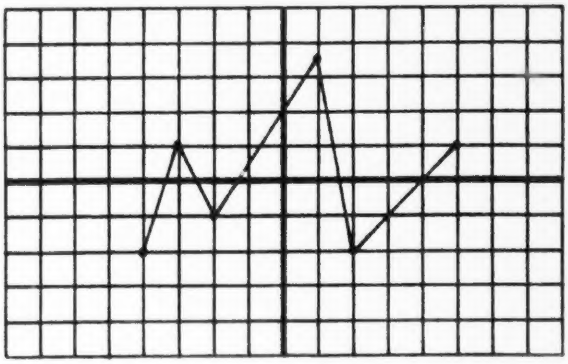
(1,4) (2,-2) (-4,2) (-3,-4)



*4.09.07.02A use line segments to connect points.

e.g.,

(-4,-2) (-3,1) (-2,-1) $(1,3\frac{1}{2})$ (2,-2) (5,1)



## VOCABULARY

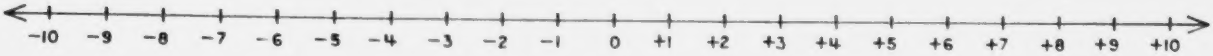
### TERMS

grid
horizontal
vertical
line segment
coordinate
consecutive

---

### GETTING STARTED 1:

Prepare and distribute a number line, numbered from -10 through +10, to each student.



Say, "What kind of numbers are on this number line? (There are positive and negative numbers on this number line.) Which are the positive numbers? (The positive numbers are the numbers to the right of the zero. Their value is greater than zero and they are marked with a plus sign.) Which are the negative numbers? (The negative numbers are to the left of the zero. Their value is less than zero and they are marked with a minus sign.) What happens to the value of positive numbers as we move from right to left on the number line? (Their value becomes less.) What happens to the value of negative numbers as we move from right to left on the number line? (Although the numbers become greater, the value of the numbers is less.) What number would you find one space to the right of -6? (-7 is one space to the left of -6.) Which is greater in value, -6 or -7? (-6 is greater in value than -7.) What number is two spaces to the right of -2? (Zero is two spaces to the right of -2.)

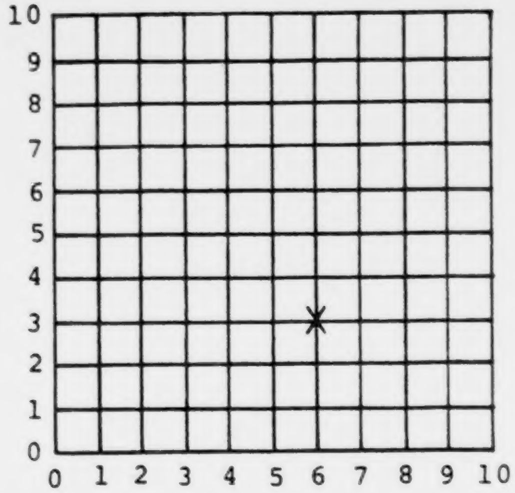
Divide the class into two teams and continue the above procedure, alternating teams. Each correct answer earns one point. The team with the most points, after a specified time, is the winner.

4.09.07

**GETTING STARTED 2:**

Display a 10 by 10 grid with an X at (6,3).

e.g.,



Say, "How many numbers are needed to label a point on a grid? (Two numbers are needed.) What do the two numbers represent? (The first number represents the horizontal position. The second number represents the vertical position.) At what position is the X on this grid? (The X is at (6,3).) The two numbers which represent the position of a point are called coordinates. Coordinates describe a location. I will write other letters on the grid. You will say the coordinates."

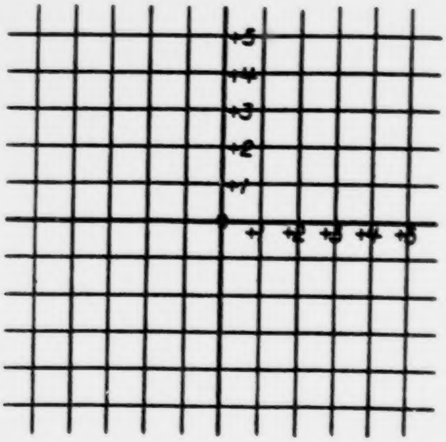
After the students have had an opportunity to locate a letter, reverse the procedure. Ask the students to name coordinates as other students indicate the location of these coordinates on the grid.

**4.09.07**

**4.09.07.01** **locate positive and negative coordinates on a grid**

**STRATEGY 1:** Prepare and distribute a grid to each student and draw a large grid on the chalkboard. The grids should be labeled horizontally and vertically from 0 through +5.

e.g.,



Say, "We have learned to locate a point on a grid by naming the coordinates which cross at that point. The numerals on the grid are similar to numerals on a number line. Say, "As we move from right to left on a number line, what happens to the value of the numbers? (The numbers decrease in value.) The numerals along the horizontal axis are +5, +4, +3 +2, +1, and 0. What number would we write one space to the left of the zero on a number line? (-1 would be written one space to the left of zero.) What would the next 4 numerals to the left be?" (After -1 we would have -2, -3, -4, and -5.) Write these negative numbers on the chalkboard grid as the students write them on their grids.

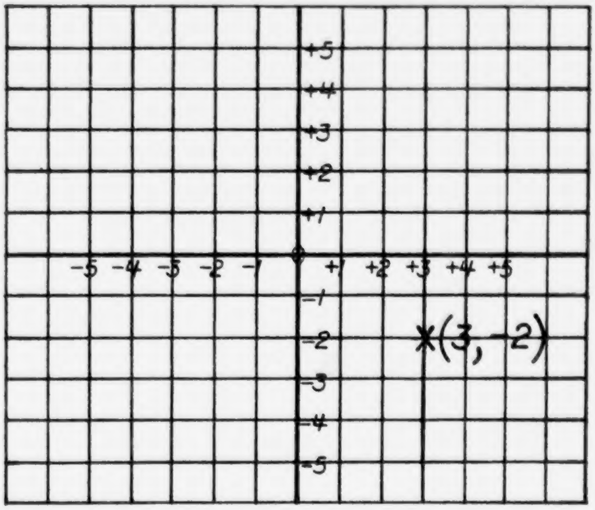
Repeat this procedure for writing the negative numbers on the vertical axis. Demonstrate at the chalkboard as the students write on their grids. Say, "Now we can use this grid to locate points. I will name the coordinates, or the pair of numbers,

**STRATEGY 1:** cont'd

where the point is." On the chalkboard write: (3,-2). Say, "We read this as three, negative two. To find this point, we locate the number on the horizontal axis. What is the first number of the coordinates? (The first number is 3.) It is positive 3 or negative 3? Explain." (It is postive 3 because a number with no symbol to its left is always a positive number.) Ask the students to locate positive 3 on the horizontal axis and place their finger on that point as you do the same on the chalkboard.

Say, "Next, we must continue to the second number of the coordinates, -2. Look at the vertical axis, or number line. From where our fingers are, which way must we move to go to -2? (We must move down to -2.) Move down the line your finger is on till you reach -2." Demonstrate on the chalkboard grid. Say, "This point is called (3,-2). Place an X on the point and label it, (3,-2)."

e.g.,

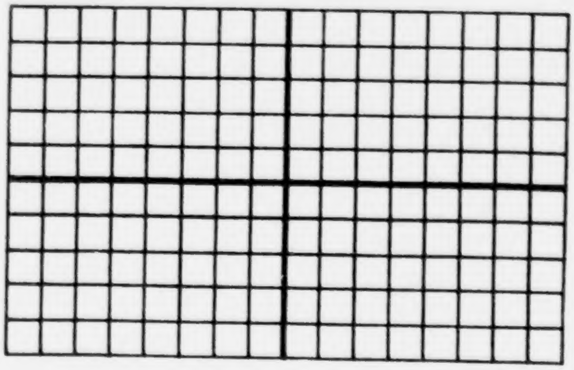


Repeat this procedure to locate other points on the grid.

**4.09.07**

**4.09.07.02** **use line segments to connect points**

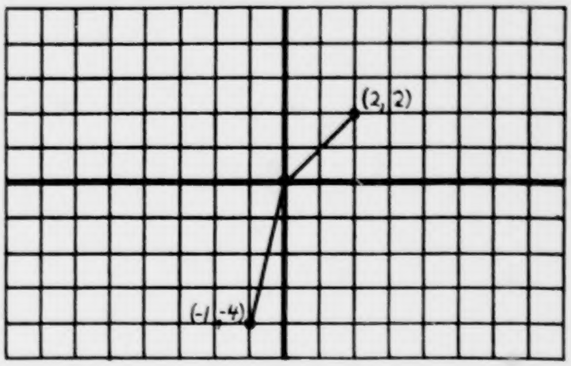
**STRATEGY 1:** Prepare and distribute graph paper with vertical and horizontal axes.
e.g.,



Say, "The point where the vertical and horizontal axes cross is (0,0). What does that mean? (It means that the point where the two axes meet is located at the coordinates (0,0)). On the chalkboard write: (2,2). Say, "Where is point (2,2) located?" (Point (2,2) is 2 spaces to the right of zero and two spaces up from the horizontal axis.) Ask the students to mark and label the point at (2,2).

On the chalkboard write (-1,-4). Say, "Where do we find this point?" (This point is found 1 space to the left of 0, and 4 spaces down from the horizontal axis.) Ask the students to mark and label (-1,-4). Say, "Let's connect points (2,2) and (0,0). What have we just drawn. (We have drawn a line segment.) Let's connect points (0,0) and (-2,-4)." Demonstrate. Say, "How many line segments did we draw to join these points? (We drew 2 line segments, one from (2,2) to (0,0) and another from (0,0) to (-1,-4).

**STRATEGY 1:** e.g.,
cont'd

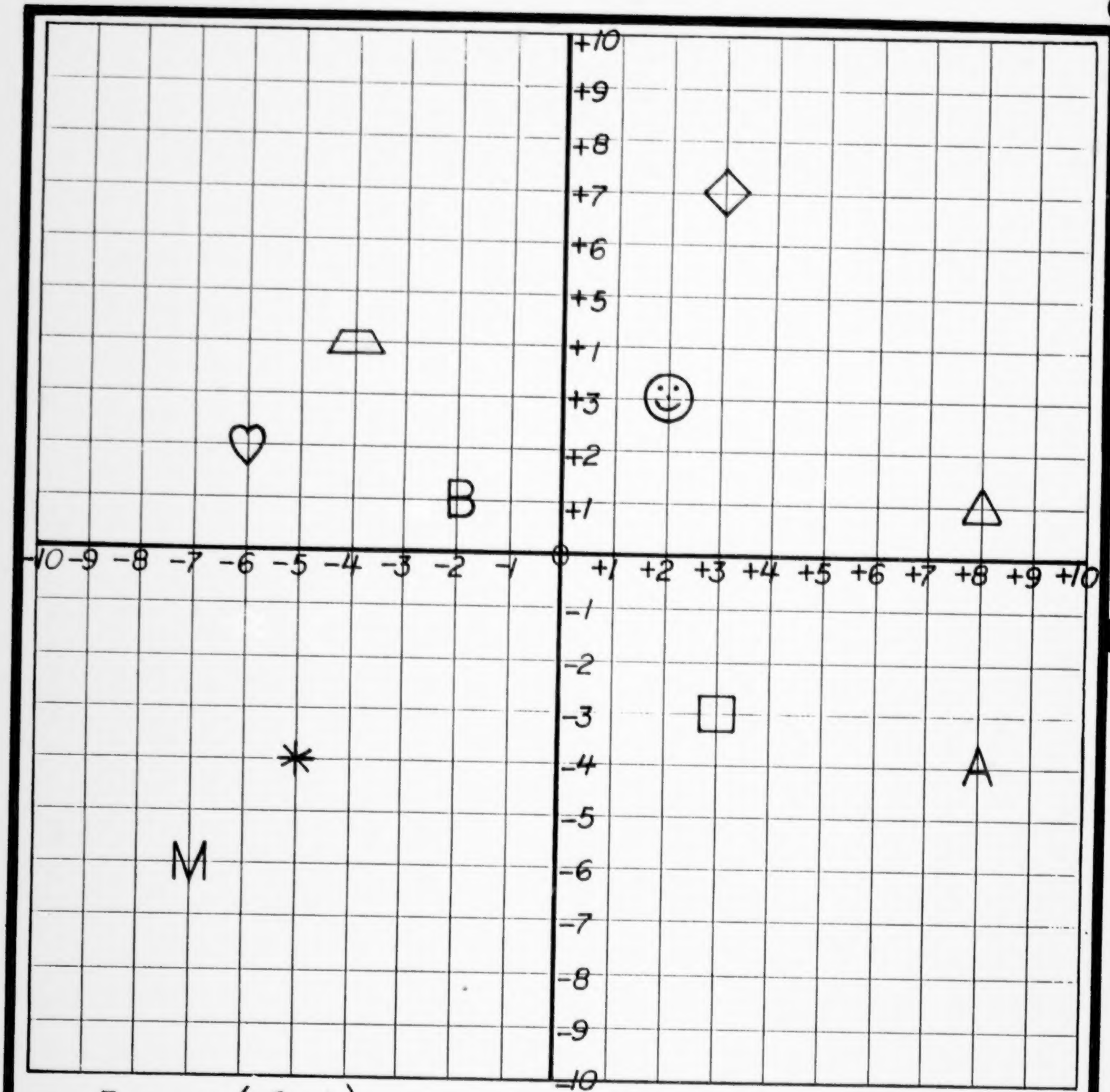


Repeat this procedure by naming several coordinates and asking the students to mark the points and connect consecutive points with line segments.

P.O. 4.09.07.01

NAME: ______________________ CLASS: __________ DATE: __________

Locate the coordinates.



+10
+9
+8
+7
+6
+5
+4
+3
+2
+1
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
B
M
A

The B is at (-2, 1).

The ♡ is at __________.

The ◇ is at __________.

The □ is at __________.

The ✳ is at __________.

The △ is at __________.

The ⏢ is at __________.

The M is at __________.

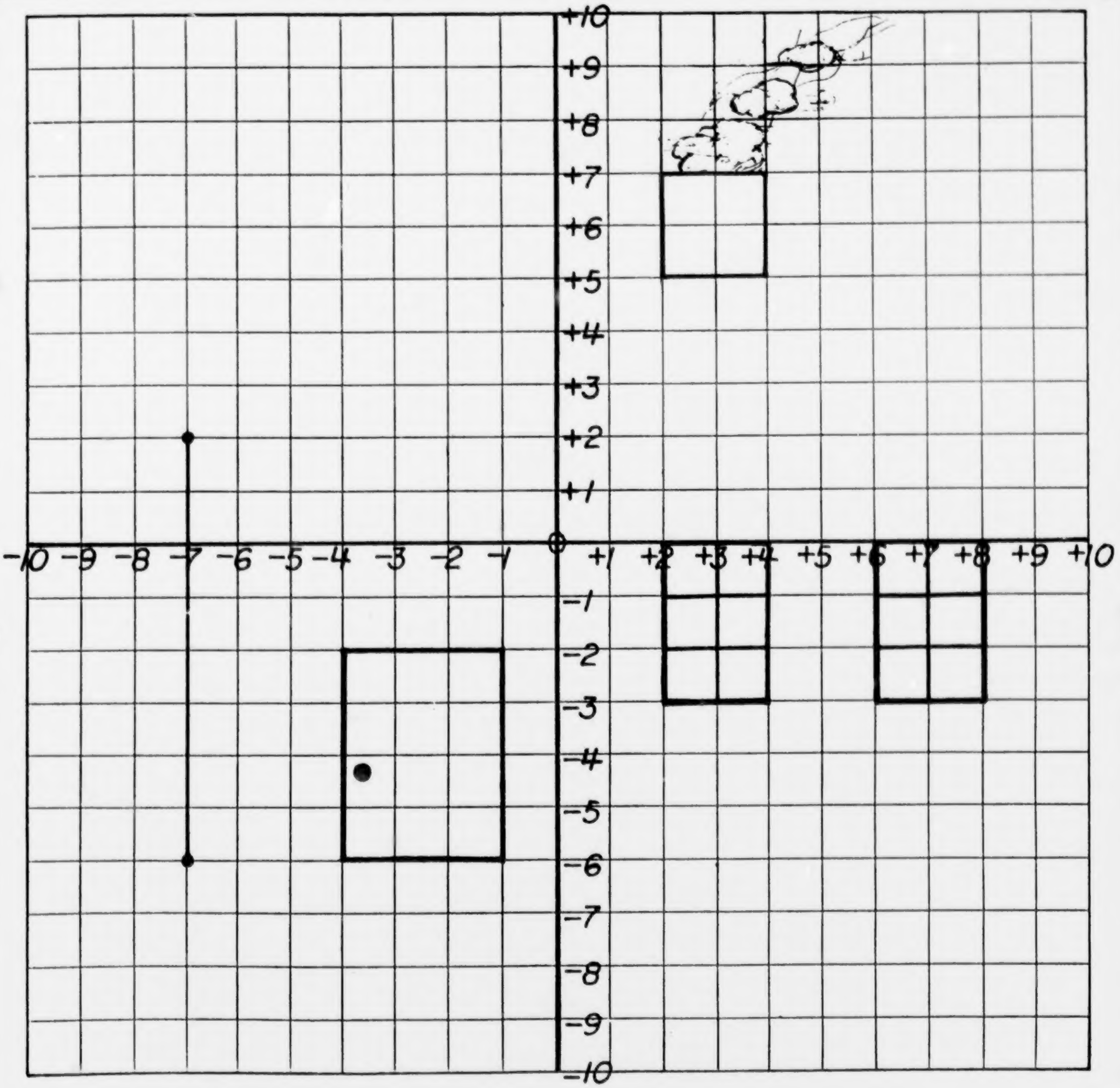
The A is at __________.

The ☺ is at __________.

P.O. 4.09.07.02

NAME: ____________________ CLASS: __________ DATE: ________

Locate the coordinates. Connect the points in order.



+10
+9
+8
+7
+6
+5
+4
+3
+2
+1
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1
+1 +2 +3 +4 +5 +6 +7 +8 +9 +10
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10

| | | | |
|---|---|---|---|
| ① (-7,-6) | ⑤ (1,-6) | ⑨ (9,2) | ⑬ (1,2) |
| ② (-7,2) | ⑥ (-7,-6) | ⑩ (6,6) | ⑭ (9,2) |
| ③ (-3,6) | ⑦ (1,-6) | ⑪ (-3,6) | |
| ④ (1,2) | ⑧ (9,-5) | ⑫ (-7,2) | |

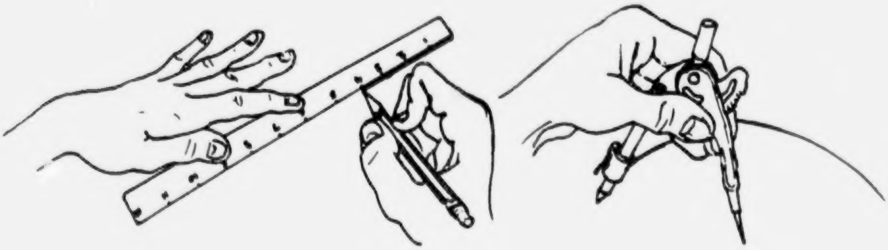
## 4.09.08 GEOMETRIC DESIGNS

(1 lesson)

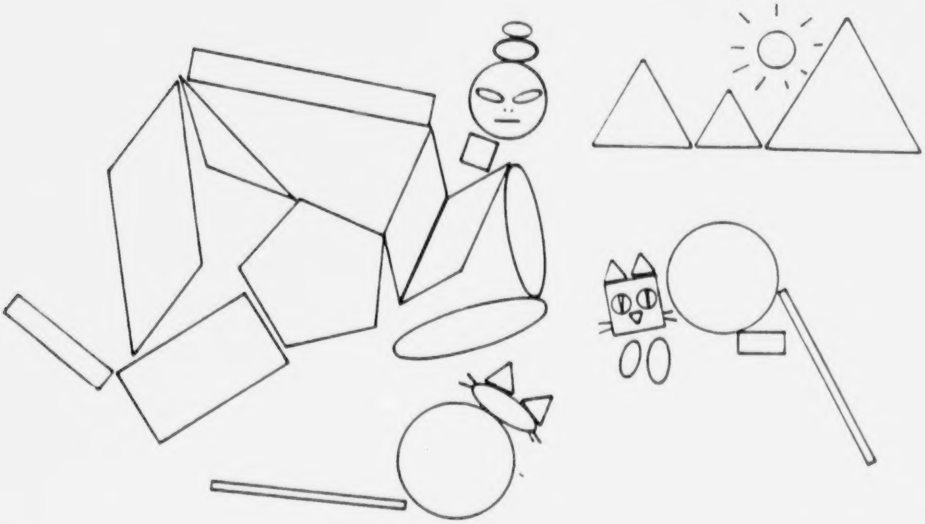
### PERFORMANCE OBJECTIVES

The student will be able to...

4.09.08.01B construct geometric figures using straight-edge rulers, protractors, and compasses; e.g.,



4.09.08.02B use geometric figures to make designs and pictures. e.g.,



## VOCABULARY

### TERMS

design
geometric
protractor
compass

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### GETTING STARTED 1:

Prepare and distribute several magazine pictures, illustrating various plane figures and solid figures, to each group of students. Say, "You will have 3 minutes to identify as many geometric figures as possible in your picture. When the time is up, a member of each group will come to the front of the room and name all the figures his/her group was able to identify. Each figure that is identified correctly will earn one point." After the students have identified the figures, the points should be totaled. The group with the most points is the winner.

---

### GETTING STARTED 2:

Prepare and distribute geoboards and rubberbands to each student or group of students. (Dot paper may be used in place of geoboards. See Resource Material.) Say, "What is a quadrilateral? (A quadrilateral is a figure with 4 sides.) Construct a quadrilateral on your geoboards."

Say, "Did anyone construct a quadrilateral with 4 equal sides?" Ask the student(s) who constructed this kind of quadrilateral to display it for the other students. Say, "What do we call this special quadrilateral?" (It is called a square.) Repeat this procedure for constructing other quadrilaterals (rectangles, parallelo-grams, trapezoids) as well as for pentagons, hexagons, and octagons.

**4.09.08**

**4.09.08.01** **construct geometric figures using straight-edge rulers, protractors, and compasses**

**STRATEGY 1:** Prepare and distribute a ruler, a compass, a protractor, and several sheets of drawing paper to each group of students. Say, "What kind of lines can we draw with a ruler?" (We can draw straight lines with a ruler.) Display a compass. Say, "We can use this compass to draw circles of various sizes." Display a protractor. Say, "We can use this protractor several ways. We can use its straight edge as a ruler. We can trace around it and draw a half circle, or semi-circle. It can also be used to measure an angle of a figure. We will use it, along with the other tools, to draw geometric shapes. First, we will use the compass to draw a circle. Place the point of your compass on your paper and swing the pencil around until a circle is formed." Demonstrate. Say, "Open the compass so there is more space between the point and the pencil and draw another circle. How does this circle compare to the first circle you drew?" (The second circle is larger than the first circle.) After the students have had an opportunity to draw more circles, say, "What can you say about the opening of the compass?" (The bigger the opening is, the bigger our circle will be.)

Say, "Trace around your protractor." Demonstrate. Say, "What shape have you drawn? (We have drawn a half circle.) We can also call this a semi-circle. How can we use the protractor to draw a complete circle?" (We can flip it over and continue the circle.) Demonstrate. Say, "How will this circle be different from the circles we drew with the compass?" (We can only draw one size circle because the protractor cannot be changed to make different size circles as the compass can.)

**STRATEGY 1:** cont'd

Say, "Using your ruler, draw a horizontal line segment that is 4 cm long. How can we add line segments to it to make a rectangle?" (We can draw a 4 cm line segment directly above, or below, this one and join the endpoints with two more line segments of equal length.) Ask the students to construct this and other rectangles.

Repeat this procedure to construct squares, triangles, and other polygons. The students may save these drawings for use with Strategy 2, P.O. 4.09.08.02.

**Note:** When using the protractor to draw a circle, some students may note that two circles can be drawn, one using the outer edge of the protractor and another using the inner edge. Also, students who exhibit an interest may be shown how to use the protractor to construct a 90° angle, or right angle, to draw rectangles and squares.

**4.09.08.02** **use geometric figures to make designs and pictures**

**STRATEGY 1:**

Prepare a supply of geometric shapes cut from various colors of construction paper, scissors, glue, drawing paper, and several magazine pictures which show items representing geometric shapes.. Pictures might include skyscapers, bridges, a room in a house, floor tile, furniture, a stained glass window ... Display a picture and ask the students to identify the geometric shapes they see in the picture. Say, "You will have a chance to create your own pictures using geometric shapes.

Distribute a variety of shapes to each student. Say, "What might a triangle represent in your picture?" (It might represent an ice cream cone, a hat, a roof on a building, ...) Repeat this procedure for other shapes. Say, "You might want to create an artistic

**STRATEGY 1:** cont'd

design instead of a picture representing a scene." Distribute the glue and the scissors and ask the students to begin. When their designs or pictures are completed, ask the students to describe their work and give it a title. These pictures may be displayed in the classroom.

**STRATEGY 2:**

Prepare scissors, glue, drawing paper, and the construction paper with the shapes drawn by the students in Strategy 1, P.O 4.09.08.01.

Distribute the construction paper with the geometric shapes. Ask the students to name each shape and describe it. Say, "We will cut out these shapes and use them to create a picture or a design." Allow time for discussion about what kinds of pictures or designs the students can make using these shapes.

Distribute the drawing paper, scissors, and glue. Say, "Use your geometric shapes to create a picture or a design." Several students may wish to work together, combining all their geometric shapes. When the pictures are completed, they may be displayed in the classroom.

P.O. 4.09.08.01

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

| | |
|---|---|
| Draw two circles, one inside the other, in this space. | Draw a square in this space. |
| Draw a triangle in this space. | Draw a parallelogram in this space. |

## CHALLENGE!

Draw a circle with a radius of 2 cm.

Hint: Draw the radius first.

Unit 73

## 4.06.09 RATIO

(2 lessons)

### PERFORMANCE OBJECTIVES

The student will be able to...

*4.06.09.01A write a ratio to represent a relationship between two quantities;

e.g.,

The ratio of paint brushes to pencils is 2 to 3. The ratio may also be written as a fraction, $\frac{2}{3}$.

4.06.09.02A solve word problems related to skills learned in this module.

e.g.,

- There were 2 cats, 4 dogs, and 8 birds in the Pet Shop. What is the ratio of dogs to all the animals?

- If 2 pens cost 50¢, what is the cost of one pen? What is the cost of 4 pens?

4.06.09

**VOCABULARY**

**TERMS**

ratio
comparison

---

**GETTING STARTED 1:**

Prepare a set of flash cards for multiplication facts and division facts. Also prepare a set of Bingo cards having factors and products on them.

e.g.,

| | | | | |
|---|---|---|---|---|
| 9 | 0 | 3 | 5 | 6 |
| 72 | 27 | 49 | 20 | 24 |
| 4 | 1 | 16 | 8 | 45 |
| 5 | 28 | 36 | 63 | 2 |
| 18 | 56 | 15 | 40 | 42 |

Distribute a Bingo card and markers to each small group of students. Say, "I will display a flashcard thst shows either a multiplication fact or a division fact. If the answer to the fact appears on your Bingo card, cover it with a marker. The group that covers five numerals in a row, vertically, horizontally, or diagonally is the winner."

Play the game until one group wins.

---

**GETTING STARTED 2:**

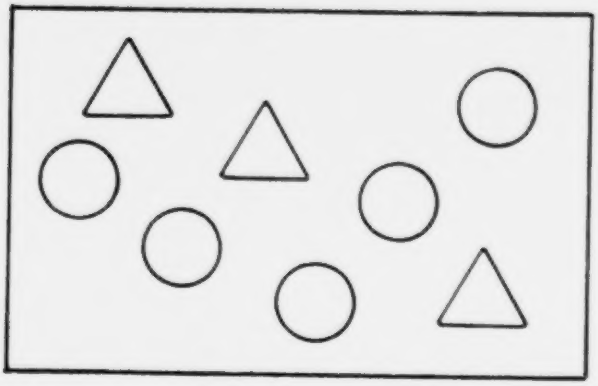
Prepare and display several circles (cubes, rods) of various colors. Display 2 red circles and 5 blue circles. Say, "How many circles are there in all? (There are 7 circles.) How many of the circles are blue? (5 circles are blue.) What fractional part of the circles are blue? ($\frac{5}{7}$ of the circles are blue.) What fractional part of the circles are red?" ($\frac{2}{7}$ of the circles are red.)

Repeat this procedure using other arrangements of circles, cubes, or rods.

**4.06.09**

**4.06.09.01** **write a ratio to represent a relationship between two quantities**

**STRATEGY 1:** Prepare a flannel board and a supply of flannel-backed geometric shapes. Display the following on the flannel board:



Say, "We can compare the number of triangles to the number of circles by using a ratio." Write on the chalkboard: A ratio is a way of comparing numbers. Ask the students to write this in their notebooks. Say, "We will write a ratio comparing the number of triangles to the number of circles. How many triangles are there? (There are 3 triangles.) How many circles are there?" (There are 5 circles.) Say and write on the chalkboard: "The ratio of triangles to circles is 3 to 5." Explain that a ratio can also be written as a fraction. Say and write on the chalkboard: "The ratio of triangles to circles is $\frac{3}{5}$."

Say, "In stating or writing a ratio, we always state or write the number of the first item mentioned as the first number of the ratio. What is the ratio of circles to triangles?" (The ratio of circles to triangles is 5 to 3.) Ask a student to write the ratio in two different ways on the chalkboard as the other students write it in their notebooks.

Repeat this procedure by changing the type and number of figures on the flannel board and asking the students to compare them using ratios.

**STRATEGY 2:** Prepare a supply of classroom items, e.g., pencils, pens, books, erasers, ... Say, "What symbols do we use to compare numbers? (We have used the symbols for greater than, less than, or equal to.) Today we will learn to compare numbers by writing a ratio." Say and write on the chalkboard, "A ratio is a way of comparing numbers." Ask the students to write this in their notebooks.

Display 3 pencils and 1 eraser. Say, "How many pencils are there? ... erasers are there? (There are 3 pencils. There is 1 eraser.) We can say that the ratio of pencils to erasers is 3 to 1 and we can write this ratio two ways." Write the following on the chalkboard:

The ratio of pencils to erasers is 3 to 1.
The ratio of pencils to erasers is $\frac{3}{1}$.

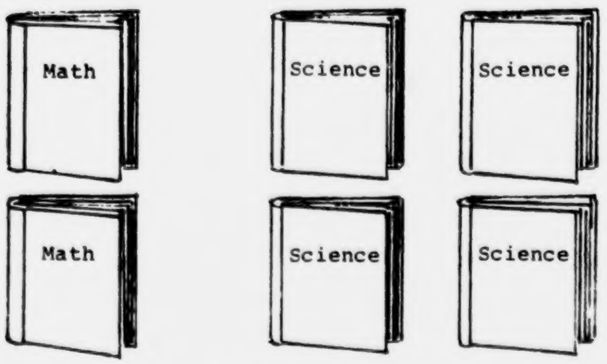
Say, "We read both sentences the same way, even though we see the ratio expressed as a fraction in the second sentence. When we state or write a ratio, the first number refers to the first item in the ratio sentence. The second number refers to the second item. What is the ratio of erasers to pencils?" (The ratio of erasers to pencils is 1 to 3.) Ask a student to write the ratio on the chalkboard two ways, e.g., 1 to 3 or $\frac{1}{3}$.

Display 1 mathematics book and 2 science books. Say, "What is the ratio of mathematics books to science books? (The ratio of mathematics books to science books is 1 to 2.) What is the ratio of science books to all the books? (The ratio of science books to all the books is 2 to 3. If I add 1 more mathematics book, how many more science books will I have to add to this group so the ratio will not change?" (You will have to add 2 more science books.) Demonstrate.

**4.06.09**

**STRATEGY 2:** cont'd

e.g.,



Repeat this procedure by comparing the number of other classroom items placed in groups. Ask the students to write a ratio to show each comparison. **Note:** This strategy may be more effective with more advanced students.

4.06.09.02 **solve problems related to skills learned in this module**

**STRATEGY 1:** Prepare and display a word problem relating to ratio. e.g.,

> The ratio of pens to students is 10 to 5. If the students share the pens equally, how many pens will each student receive?

Ask a student to read the problem aloud. Say, "What information does this problem give us? (The ratio of pens to students is 10 to 5.) What are we asked to find? (We must find how many pens each student will receive if they share the pens equally.) How can we solve this problem? (We can divide the 10 pens among the 5 students.) What is another way to write a ratio?" (A ratio can be written as a fraction.) Ask a student to write the ratio, 10 to 5, as a fraction on the chalkboard as the other students do the same in their notebooks.

e.g.,

$\frac{10}{5} =$

**STRATEGY 1:** cont'd

Say, "What kind of a fractions is $\frac{10}{5}$? ($\frac{10}{5}$ is an improper fraction.) What else can this fraction represent?" (It can represent a division example.) Ask a student to solve the division example on the chalkboard as the other students do the same in their notebooks.

e.g.,

$$\frac{10}{5} = 2$$

Say, "How many pens will each student receive? (Each student will receive 2 pens.) How can we be sure our answer is correct?" (If we think about giving 2 pens to each of 5 students, we will use 10 pens.

Repeat this procedure with other types of problems relating to ratios in a variety of ways.

e.g.,

If 4 donuts cost $.80, what will 8 donuts cost?

There were 3 parakeets, 4 parrots, and 1 homing pigeon in the pet shop. What is the ratio of parrots to all the birds?

Sarah prepared for a party by decorating her house with 30 balloons. 12 of the balloons were red. What is the ratio of red balloons to the balloons that were not red?

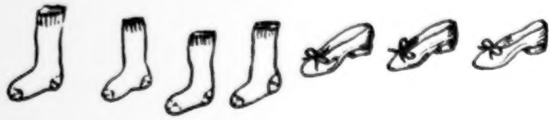
P.O. 4.06.09.01

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

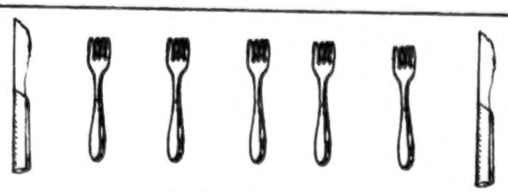
Write a ratio for each picture below.

①



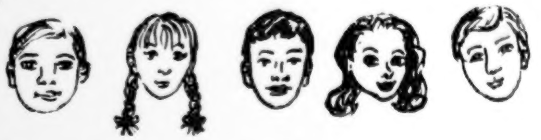
The ratio of socks to shoes is ______ to ______.

②



The ratio of knives to forks is ______ to ______.

③



The ratio of girls to boys is ______ to ______.

The ratio of girls to all the children is ______ to ______.

④

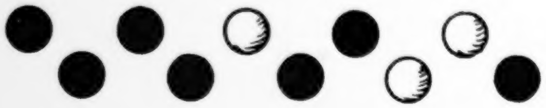
□ ○ □ ○ ○ ○ ○ □

The ratio of circles to squares is ______ to ______.

The ratio of squares to all the figures is ______ to ______.

Write each ratio below as a fraction.

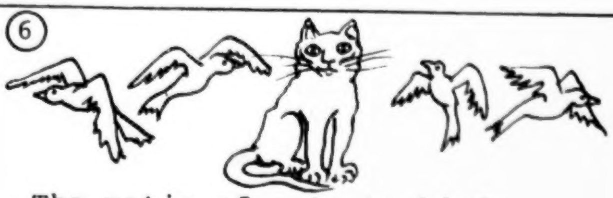
⑤



The ratio of black marbles to white marbles is _____.

The ratio of white marbles to all the marbles is _____.

⑥



The ratio of cats to birds is _____.

The ratio of birds to cats is _____.

## Do you remember?

Round each number to the nearest hundred.

279 rounds to ___________.

3,420 rounds to ___________.

741 rounds to ___________.

14,501 rounds to ___________.

P.O. 4.06.09.02

NAME: ________________________ CLASS: __________ DATE: ________

Solve the problems below.

1. Jackie set the table with 4 knives, 4 forks, and 4 spoons. What is the ratio of forks to all the items?

________ to ________

2. The ratio of boys to girls in class 4-408 is $\frac{14}{18}$.
How many students are in the class?

__________ students

3. Martha's punch recipe calls for 1 cup of orange juice and 2 cups of cranberry juice. If she wants to double the recipe, she should use 2 cups of orange juice and _____ cups of cranberry juice.

4. The ratio of pencils to students is 24 to 6. If the students share the pencils equally, how many pencils will each student get?

__________ pencils

5. If 2 pens cost 40¢, what will 4 pens cost?

4 pens will cost ________

6. There are 30 students in class 4-201. If 12 of the students are boys, what is the ratio of boys to girls?

_______ to _______

## CHALLENGE!

There were 12 boys and 15 girls in the library. Two boys and two girls left the library. Then, four more boys and five more girls came into the library. What is the ratio of boys to girls now?

The ratio of boys to girls is _____ to _____.

# SHARPENING YOUR SKILLS

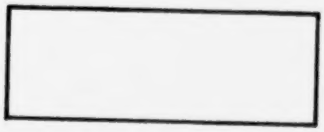
**Units 70, 71, 72, 73**

**Name:** ____________________ **Class:** ____________ **Date:** _________

1. Draw a ring around the letter below that has a line of symmetry. Draw the line of symmetry.

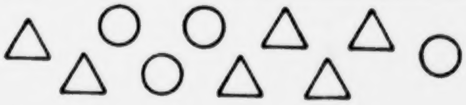
F L M Z

2. Draw two lines of symmetry in the figure below.



3. Use a ruler to draw a square. Each side should measure 1 inch.

4.



The ratio of circles to triangles is ____ to ____.

5. The ratio of girls to boys in your class is ____ to ____.

6. If 3 pretzels cost 10¢, what will 6 pretzels cost?

ⓐ 16¢ ⓒ 9¢

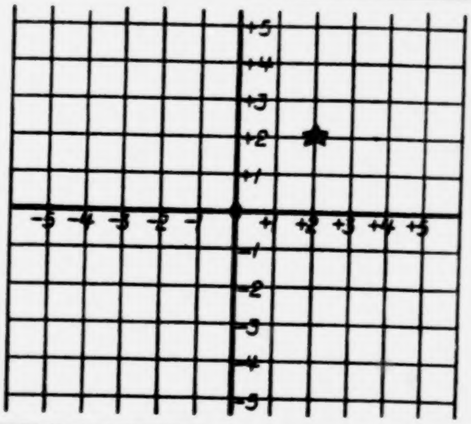
ⓑ 20¢ ⓓ Not Here

7. If 4 pencils cost 20¢, what will one pencil cost?

ⓔ 5¢ ⓖ 16¢

ⓕ 24¢ ⓗ Not Here

8.



ⓐ Place an X at (3,4).

ⓑ Place a Z at (-2,-1).

ⓒ Draw a ☺ at (5,-2).

ⓓ Draw a △ at (-4,4)

ⓔ The star is at (__,__).

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
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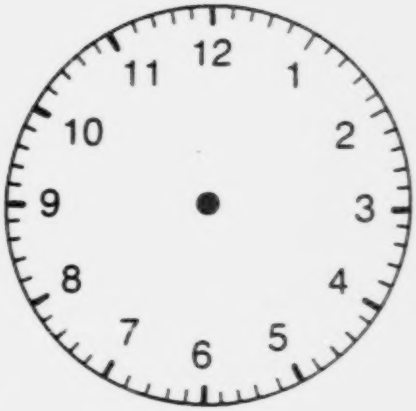
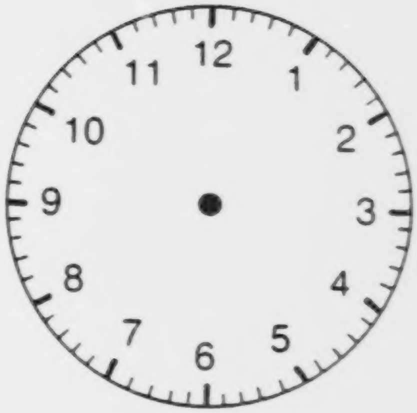
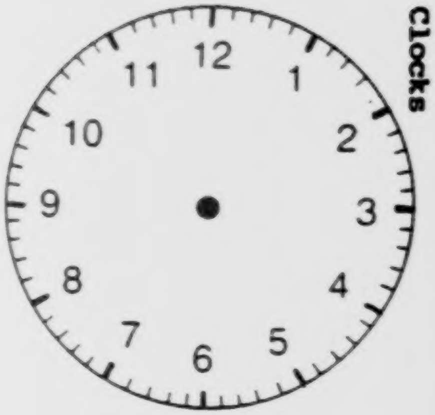
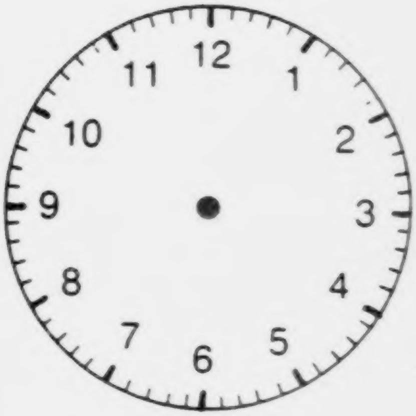
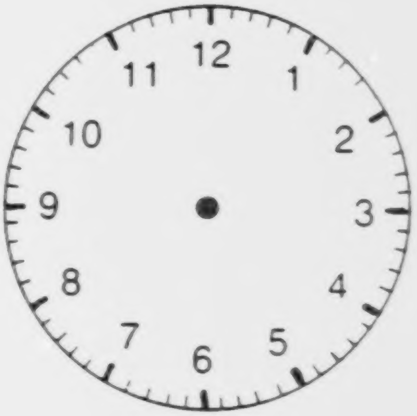
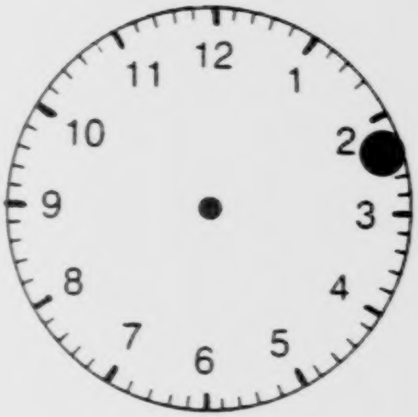


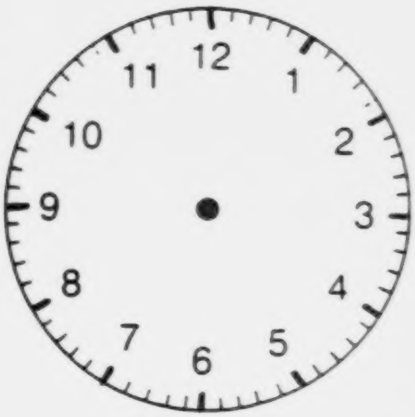


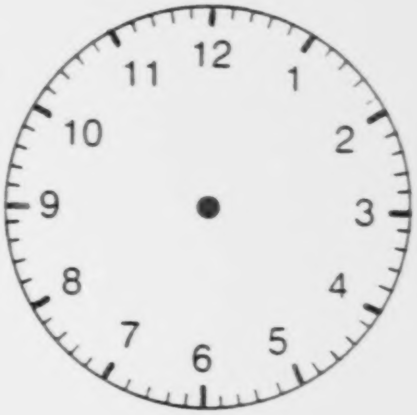


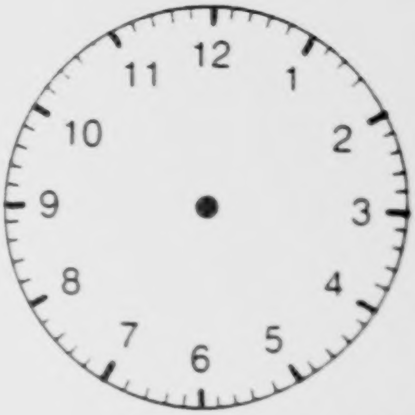






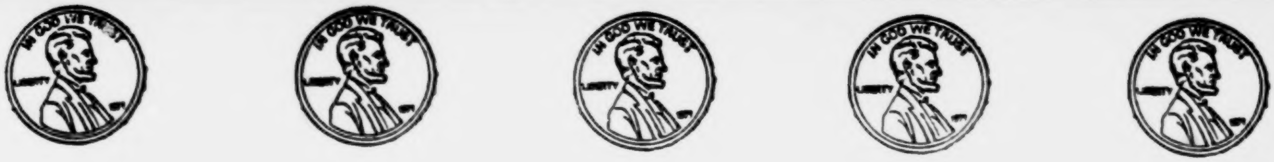


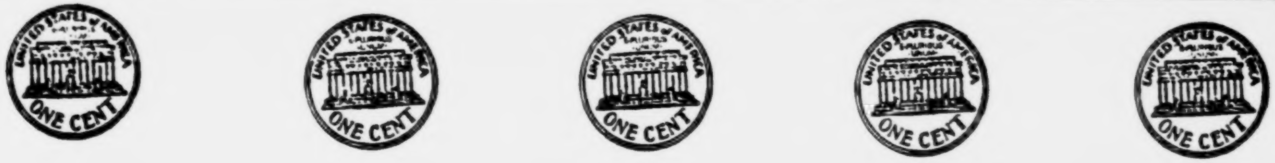




## RESOURCE MATERIAL - Hundred Chart

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |


IN GOD WE TRUST
LIBERTY
1971


UNITED STATES of AMERICA
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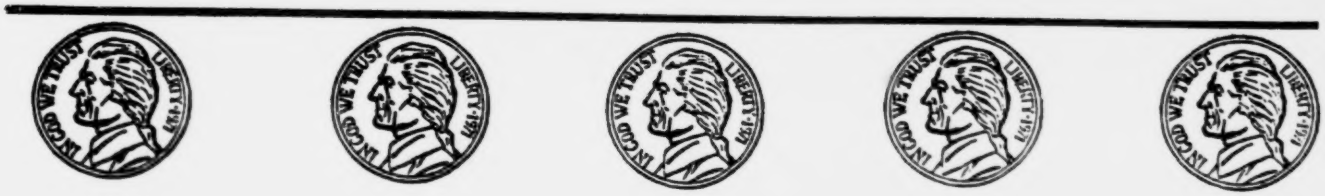
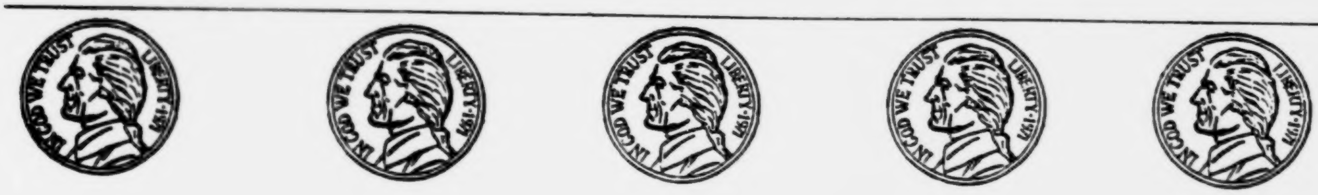
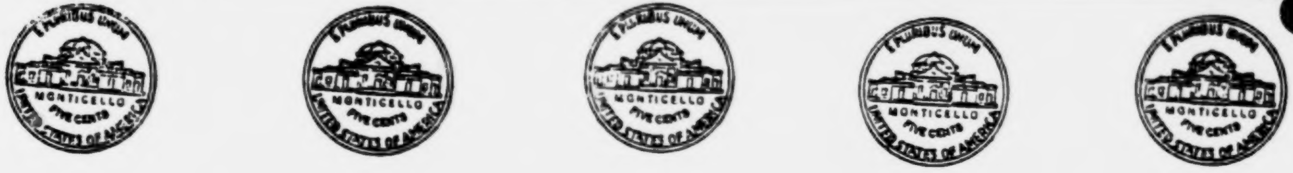

IN GOD WE TRUST
LIBERTY · 1971


IN GOD WE TRUST
LIBERTY · 1971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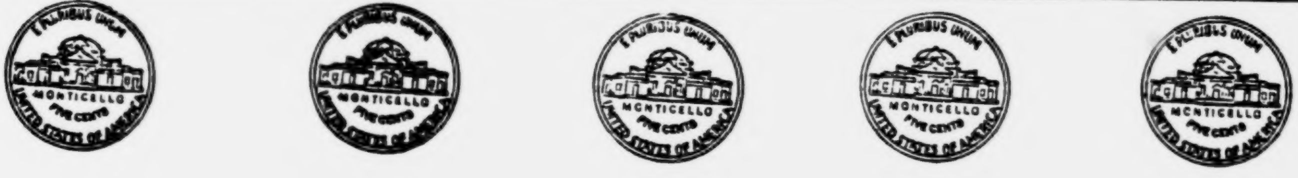
MONTICELLO
FIVE CENTS
UNITED STATES OF AMERICA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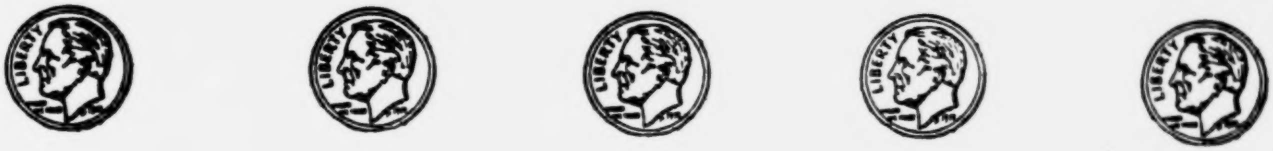
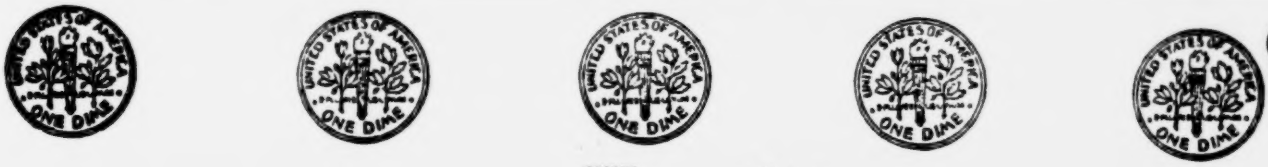
MONTICELLO
FIVE CENTS
UNITED STATES OF AMERICA


LIBERTY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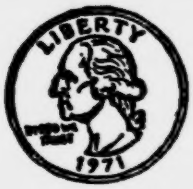
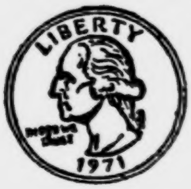
ONE DIME


LIBERTY
IN GOD WE TRUST
1971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IN GOD WE TRUST
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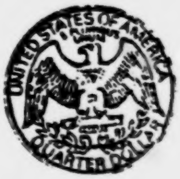
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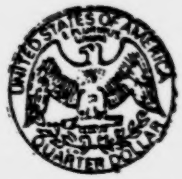
QUARTER DOLLAR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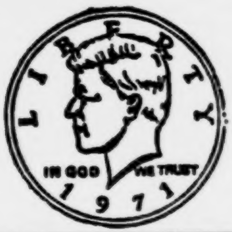
QUARTER DOLLAR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IN GOD WE TRUST
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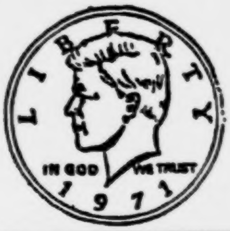
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IN GOD WE TRUST
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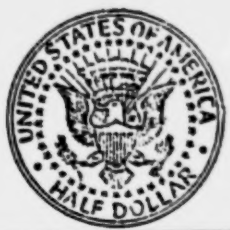
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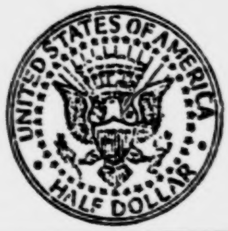
HALF DOLLAR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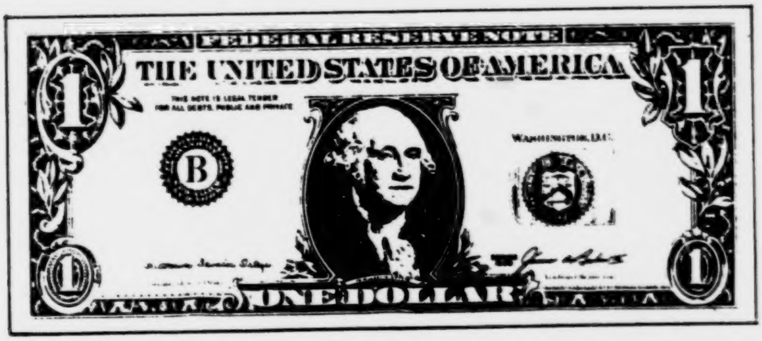
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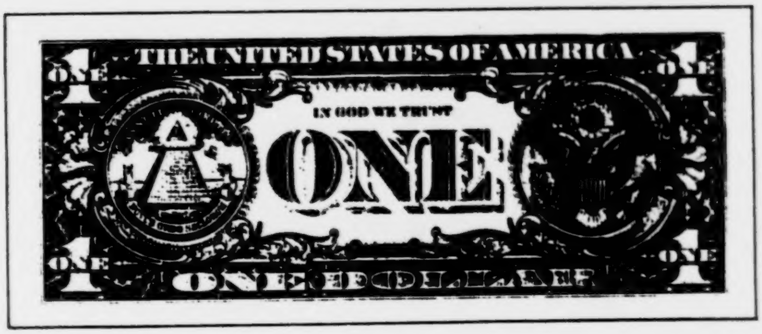
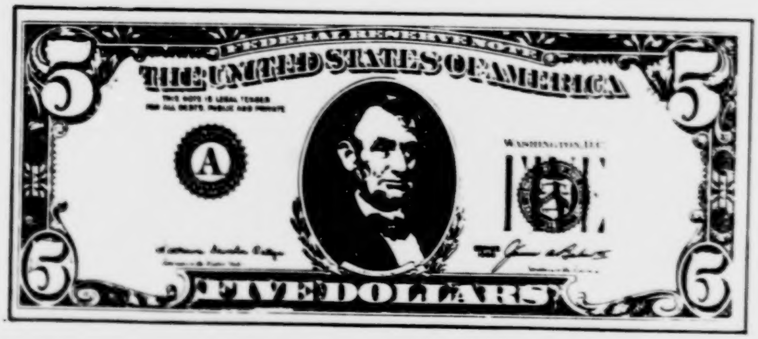
THE UNITED STATES OF AMERICA
THIS NOTE IS LEGAL TENDER FOR ALL DEBTS, PUBLIC AND PRIVATE
B
WASHINGTON, D.C.
1
ONE DOLLAR


THE UNITED STATES OF AMERICA
IN GOD WE TRUST
ONE
ONE DOLLAR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THE UNITED STATES OF AMERICA
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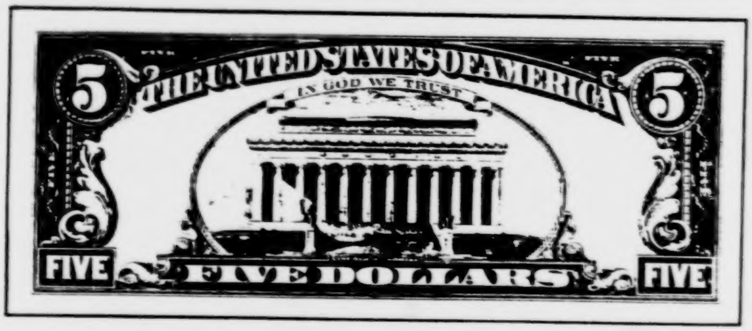
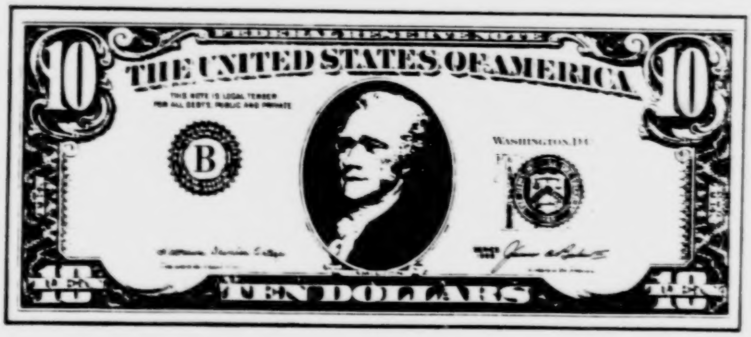
A
WASHINGTON, D.C.
FIVE DOLLARS


THE UNITED STATES OF AMERICA
IN GOD WE TRUST
5
FIVE
FIVE DOLLARS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THE UNITED STATES OF AMERICA
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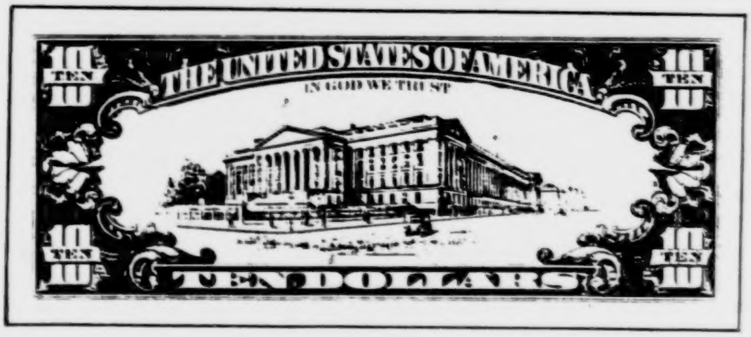
B
WASHINGTON, D.C.
TEN DOLLARS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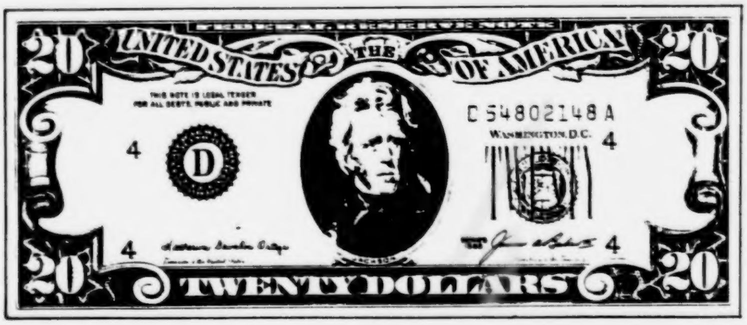
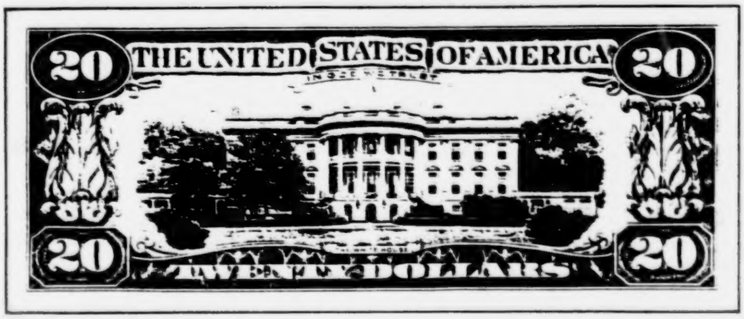
IN GOD WE TRUST
10
TEN
TEN DOLLARS


FEDERAL RESERVE NOTE
UNITED STATES
THE
OF AMERICA
20
THIS NOTE IS LEGAL TENDER FOR ALL DEBTS, PUBLIC AND PRIVATE
D54802148A
WASHINGTON, D.C.
D
4
TWENTY DOLLARS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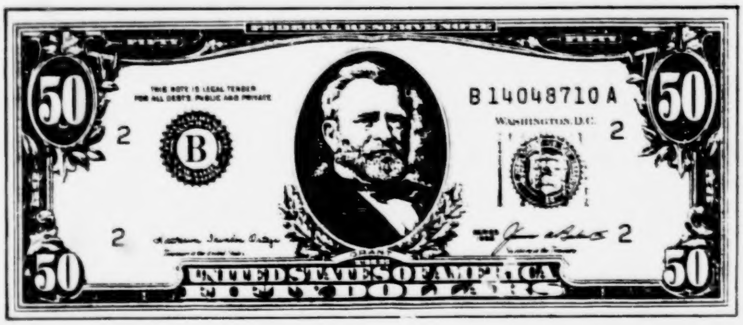
20
TWENTY DOLLARS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WASHINGTON, D.C.
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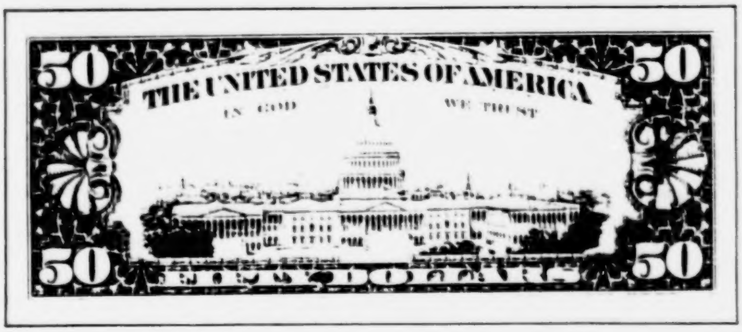
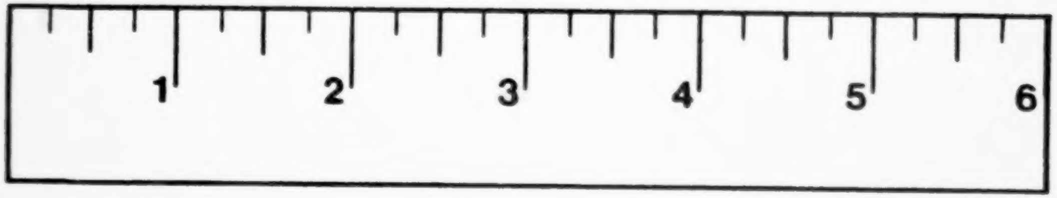
2
GRANT
UNITED STATES OF AMERICA
FIFTY DOLLARS

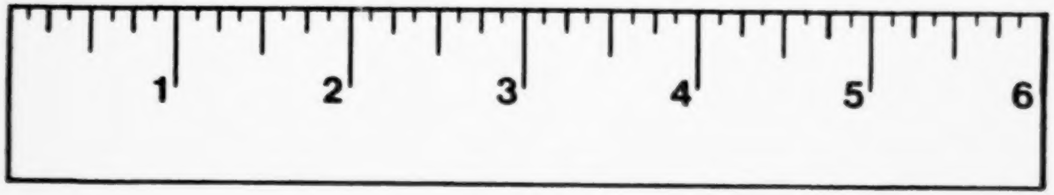

50
THE UNITED STATES OF AMERICA
IN GOD WE TRUST
FIFTY DOLLARS

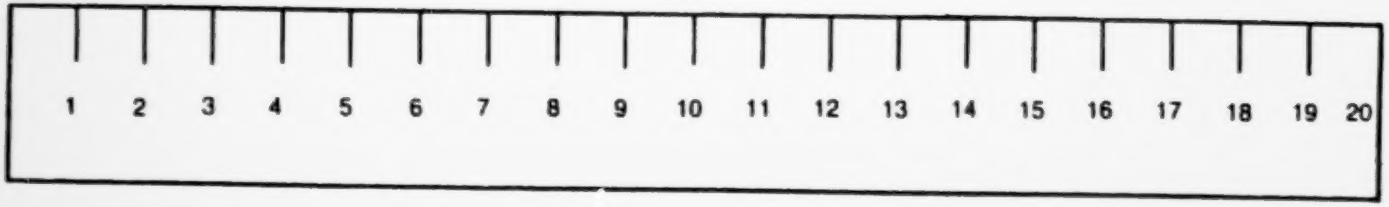
417

RESOURCE MATERIAL - Dot Paper (1) Geometry

## ESOURCE MATERIAL - Dot Paper (2) Geometry







RESOURCE MATERIAL - Graph Paper

RESOURCE MATERIAL - Graph Paper

# TABLE OF SYMBOLS

| DEFINITIONS | SYMBOL | DEFINITIONS | SYMBOL |
|---|---|---|---|
| plus; add; positive | + | line | ↔ |
| minus; subtract; negative | - | ray | → |
| plus or minus | + or - | perpendicular lines | ⊥ |
| times; multiply | · or X | parallel lines | ∥ |
| divide | ÷ | degree | ° |
| divide | ⟌ | equals | = |
| square root | √ | is not equal to | ≠ |
| cube root | ∛ | is less than | < |
| angle | ∠ | is greater than | > |
| between two numerals or letters at the end of a series or sequence; and so on | ... | encloses a set when numbers are included: empty set when empty | { } |
|  |  | subset | ⊂ |
| triangle | △ | intersection | ∩ |
| rectangle | ▭ | union; join | ∪ |
| parallelogram | ▱ | percent | % |
| circle | ⊙ | foot, minute | ' |
|  |  | inch, second | " |
| line segment (as $\overline{AB}$ ) | — |  |  |

# METRIC TABLE

| PREFIX | VALUE | LENGTH | CAPACITY | WEIGHT (MASS) |
|---|---|---|---|---|
| **KILO** | 1000 | kilometer*<br>(km) | kiloliter<br>(kl) | kilogram*<br>(kg) |
| **HECTO** | 100 | hectometer<br>(hm) | hectoliter<br>(hl) | hectogram<br>(hg) |
| **DEKA** | 10 | dekameter<br>(dam) | dekaliter<br>(dal) | dekagram<br>(dag) |
|  | 1 | meter*<br>(m) | liter*<br>(l) | gram*<br>(g) |
| **DECI** | $\frac{1}{10}$ or .10 | decimeter<br>(dm) | deciliter<br>(dl) | decigram<br>(dg) |
| **CENTI** | $\frac{1}{100}$ or .01 | centimeter*<br>(cm) | centiliter<br>(cl) | centigram<br>(cg) |
| **MILLI** | $\frac{1}{1000}$ or .001 | millimeter*<br>(mm) | milliliter<br>(ml) | milligram*<br>(mg) |

* most frequently used

# BASIC CLASSROOM EQUIPMENT CHECKLIST

**MATERIALS:**

Abacus - Class size/indiv....... ____

Attribute blocks................ ____

Balance Beam.................... ____

Calculators..................... ____

Calendar - class size........... ____

Clock - large - class size...... ____

Clock - individual size......... ____

Clock - stamp................... ____

Coin stamps..................... ____

Compass......................... ____

Cubic counting blocks........... ____

Cuisenaire rods................. ____

Dominoes........................ ____

Felt cut-outs................... ____

Flannel board................... ____

Flash cards..................... ____

Fractional parts (assorted)..... ____

Geo boards...................... ____

Geometric patterns.............. ____

Hundred charts - class size/ind. ____

Interlocking cubes.............. ____

Laminating paper................ ____

Magnetic board.................. ____

Magnetic discs.................. ____

Measuring tools-English, Metric (rulers, scales, compasses, protractors, beakers, cups, spoons, thermometers).......... ____

Number lines - class/indiv...... ____

Numerals - tactile.............. ____

Plastic discs................... ____

Play money...................... ____

Powers of Ten................... ____

Protractor...................... ____

SEE calculators................. ____

Scale........................... ____

Screen (pull-down type)......... ____

Spinners........................ ____

Squared place value material.... ____

Standard playing cards.......... ____

Tangrams........................ ____

Tens frame...................... ____

Timers (1,2,3 minute)........... ____

Tokens (various sizes/colors)... ____

Trundle wheel................... ____

**SUPPLIES:**

Adding machine tapes (for classroom/ind. number lines)...... ____

Chalk........................... ____

Construction paper.............. ____

Elastic bands................... ____

# BASIC CLASSROOM EQUIPMENT CHECKLIST

**SUPPLIES**: cont'd

Envelopes (all sizes).......... ____
Erasers, board/individual...... ____
Felt pens (all sizes).......... ____
Ditto, Rexograph paper......... ____
Glue........................... ____
Gram weights................... ____
Graph paper (1 cm, ½, 1")...... ____
Grease pencils................. ____
Oak tag........................ ____
Paper clips.................... ____
Paste.......................... ____
Plastic discs.................. ____
Pointer........................ ____
Primary pencils................ ____
Rubber bands................... ____
Scissors - primary, left hand.. ____
Scotch tape.................... ____
Spinner........................ ____
String......................... ____
Tape........................... ____

**COLLECTIBLES**:

Beads and beans................ ____
Bottle caps.................... ____
Buttons........................ ____
Cardboard (all sizes).......... ____
Cereal boxes................... ____
Coffee cans.................... ____
Detergent boxes, shoe boxes, meat trays, and plastic containers.................. ____
Egg cartons.................... ____
Felt for desk mats............. ____
Ice cream sticks............... ____
Juice containers............... ____
Macaroni....................... ____
Magazines...................... ____
Menus.......................... ____
Metrically measured cartons.... ____
Milk containers................ ____
Newspapers..................... ____
Paper plates................... ____
Sand........................... ____
Spools......................... ____
String, yarn................... ____
Styrofoam...................... ____
Tongue depressors.............. ____
Wire hangers................... ____
Ziploc Bags.................... ____